XYZT

TABLES OF RPN ALGORITHMS

BY
TONY
HUTCHINS

This paper relies heavily on "Algorithms for RPN Calculators", written by John Ball, and published by John Wiley in 1978.

In fact this paper does reproduce Table 2.5.1 from John's book.

My favourite quotation from this book is from the end of the chapter entitled "Iterative Solutions of Elementary Transcendental Equations", on page 119:

Perhaps in finance, as in astronomy, much of the mystique involves knowing all 13 names for each entity or process.

Any student of compound interest will recognise the truth in this, eventually<G>. And, as far as astronomy goes I well remember how long it took me to realise that Sun is the key to local time (at the true local noon, the Sun crosses the local meridian), and the First Point of Aries is the key to local sidereal time (when local S.T. is 00:00 the First Point of Aries crosses the local meridian).

Warning: too much study of the permutations herein can cause drowsiness! However, this can be beneficial at bed-time. The tables are subdivided into groups of 5 or 6 algorithms, to assist the reader in finding patterns on the way to "blanket bay".

I must thank my dear wife Maureen for allowing some household tasks to be deferred over the last week, while this was being completed.

If anyone would like a copy of this PDF in booklet form (A5, 56pp, card cover), these can be provided, airmail postage included, for $15 (USD) each, by sending your mailing address to me at tony.hutchins@attglobal.net at which address I also accept paypal. A discount of $3 (USD) is offered to HPCC members.

Note that John's book is now out-of-print, but there are always a few second-hand copies for sale at www.abebooks.com. Good copies can he had for about $20 (USD) plus postage. Excellent value!

Here is a challenge: try and produce all 24 permutations of ABCD as shown on the third page, without using the "Roll-down" function. This can be done in 24 keystrokes, however it is not possible to return exactly to the starting point on the 24th keystroke.

Tony Hutchins
November 24, 2003.

Many thanks to Luiz Claudio Vieira for allowing me to use his KeySet4 font for the keystrokes.

I also used Luiz's fonts for the HP41 LCD and printer on the cover sheet, and the "by" is from Luiz's Voyager LCD font.

The algorithms are shown as if they are composed of single key presses. In fact some keys require a prefix on some machines.
These prefixes have not been counted in finding the shortest algorithms. The numeric keypad keys, and the ENTER and CLX key never require a prefix.

_R↑_ and _LSTx_ are shown slanted because they invariably require a prefix or shift key as well, for activation.

LSTx first appeared on "Wizard", the HP-45, and then remained on all Scientific HP calculators, always requiring a shift key. As far as purely financial calculators go, it is on the HP12C and HP38G but was not on the HP37E, or any earlier ones, apart from the HP-92, the investor printing calculator codenamed "Bobcat".

_R↑_ first appeared on "Superstar", the HP-65. It has only appeared as a primary unshifted key function on the HP-91 ("Felix") and HP-92. Generally it is not available as a keyboard function. The HP-97 and HP32SII are special in having it as a shifted function whereas R↓ and x≷y are unshifted as they normally are. The HP-34C has _R↑_ and R↓ shifted and x≷y unshifted whereas on the HP-65 and HP-67 all three are shifted functions.

ENTER↑ is shown as just ↑

As an example of how the entries for AABC, 0BCC, 0CCC and CCCC are generated, starting with values A,B,C and D in registers X,Y,Z and T, imagine for the moment a 24 key HP calculator:

```
┌────────────────────────────────────────────┐
│  ┌──────────────────────────────────────┐   │
│  │ T:                          D         │   │
│  │ Z:                          C         │   │
│  │ Y:                          B         │   │
│  │ X:                          A         │   │
│  └──────────────────────────────────────┘   │
│  ┌──────────────────────────────────────┐   │
│  │                                       │   │
│  │  [x≷y]   [R↓]   [R↑]    [LSTx]         │   │
│  │  [↑]    [CHS]   [EEX]   [CLx]          │   │
│  │  [+]    [7]     [8]     [9]            │   │
│  │  [−]    [4]     [5]     [6]            │   │
│  │  [×]    [1]     [2]     [3]            │   │
│  │  [÷]    [0]     [.]     [ON]           │   │
│  │              HP  24K                   │   │
│  └──────────────────────────────────────┘   │
└────────────────────────────────────────────┘
```

do:	↑	−	×	−
See:	C	C	C	C
	B	C	C	C
	A	B	C	C
	A	0	0	C

Special thanks to Jordi Hidalgo for quickly spotting that certain solutions could cause roundoff errors.

John himself suggested ways for me to extend his table 2.5.1, by adding in the 1s and using × and ÷ and without his genial help and encouragement this little booklet would never have appeared.

XYZT Tables

Comprising 1296 RPN algorithms (selected from the **shortest**) to produce:

* The 36*36 permutations of any 4 of 01ABCD , which includes
* The 25*25 permutations of any 4 of 0ABCD (as in Table 2.5.1)
  which includes
* The 16*16 permutations of any 4 of ABCD, which includes
* The 24 permutations of ABCD, without replication, as set out below.

**Table 2.5.1 is from "Algorithms for RPN Calculators" by John Ball,
pages 62-86. This classic work was my inspiration.**

EXAMPLE: THE 24 PERMUTATIONS OF ABCD

↓Continuous solution → Direct solutions (up to 6 steps)

	RPN	X	Y	Z	T	1	2	3	4	5	6	6 Cyclic Groupings
0	–	A	B	C	D							
1	R↑	D	A	B	C	R↑						(no-op ½)
2	R↑	C	D	A	B	R↓	R↓					
3	x≷y	D	C	A	B	R↓	R↓	x≷y				
4	R↓	**C**	**A**	**B**	D	R↓	R↓	x≷y	R↓			ROT (Z<>T)
5	R↓	A	B	D	C	R↓	R↓	x≷y	R↓	R↓		
6	R↓	B	D	C	A	R↓	R↓	x≷y	R↑			
7	x≷y	D	B	C	A	R↓	x≷y	R↓				(X<>T)
8	R↑	A	D	B	C	R↑	x≷y					
9	R↑	C	A	D	B	x≷y	R↓	x≷y				
10	R↑	**B**	**C**	**A**	D	R↓	x≷y	R↓	R↓			UNROT
11	x≷y	**C**	**B**	**A**	D	x≷y	R↓	R↓	x≷y	R↓		X<>Z
12	R↓	B	A	D	C	x≷y	R↓	R↓	x≷y	R↓	R↓	
13	R↓	A	D	C	B	R↓	x≷y	R↓	R↓	x≷y		(Y<>T)
14	R↓	D	C	B	A	**x≷y**	**R↓**	**R↓**	**x≷y**			(reverse)
15	x≷y	C	D	B	A	x≷y	R↓	R↓				
16	R↑	A	C	D	B	x≷y	R↓					
17	R↑	**B**	**A**	**C**	D	**x≷y**						X<>Y
18	R↑	D	B	A	C	x≷y	R↑					
19	x≷y	B	D	A	C	R↓	x≷y	R↓				
20	R↓	D	A	C	B	R↓	x≷y	R↓	R↓			
21	R↓	**A**	**C**	**B**	D	R↓	x≷y	R↑				Y<>Z
22	R↓	C	B	D	A	**R↓**	**x≷y**					
23	x≷y	B	C	D	A	R↓						(no-op 2/2)
24	R↑	**A**	**B**	**C**	D	No-op						No-op

The main text is 36 pages, with 36 permutations per page, then 2 pages
classifying the differences between the columns and Table 2.5.1, and finally
13 pages listing Table 2.5.1. All items in the RH Column make use of LSTx
and R↑, in addition to the operators used in the LH Column, namely: R↓,
x≷y, ↑ (ENTER), CLx, 0, 1, –, + and x.

Tersest algorithms are searched for the "best" result. *If* there is a choice
the following not entirely arbitrary criteria are applied, in order: don't
start with digit entry(as this requires an enabled stack at the beginning),
don't end with CLx or ↑(an enabled stack at the end is preferable), include
as few of the numeric keypad operators as possible (–, + etc which are
about 3 times slower to execute than the others), minimize individual key
usage (maximize multiple key usage) and finally if we still have a choice
choose the one with more instances of concentrated repeat key usage (i.e.
aabacb would beat abcbab because the 3 a's in the first are closer together
than the 3 b's in the second (also the 2 b's in the first are closer than
the 2 a's in the second)– thankfully *very few* choices come down to this –
some would prefer the nicely spaced b's in the second case).

Some algorithms alter the LASTX register (those using –,+ or x).

An XYZT program for the HP48/49

This user RPL program, called XYZT, is suitable for simulating the stack manipulations herein, with a stack containing symbolic 'A', 'B', 'C' and 'D'.

Two small files were included in XYZTPDF.ZIP: XYZT and XYZTgp. The former is suitable for simple ascii transfer (not XMODEM) to the HP48SX, G and GX, and HP49G. The latter, *XYZTgp*, is *only* suitable for *XMODEM* transfer to the *hp49g+*, and you must store it on the hp49g+ with the "gp" removed from the name, as just XYZT.

Only `x≷y` is done from the **keyboard** (the right arrow)
All other operations use the soft keys F1-F6
"rs"=right-shift. Left-shift with F1-F6 is disabled.

« 'D' 'C' 'B' 'A' 0 'LASTX' STO 1 SF	Set up stack and Flag 1
{	Start menu creation
{ "R↓ R↑"	
{ « 4 ROLLD 1 SF » « »	F1 = R↓
« 4 ROLL 1 SF » } }	rs-F1= R↑
{ "↑ LX"	
{ « 4 ROLL DROP DUP 1 CF » « »	F2 = ↑ (disable stack)
« 1 FS? {4 ROLL} IFT DROP LASTX 1 SF » } }	rs-F2= **LASTX** (uses Flag 1)
{ "CLX α"	
{ « DROP 0 1 CF » « »	F3 = **CLX** (disable stack)
« DEPTH 4 MIN DROPN XYZT » } }	rs-F3= re-start XYZT
{ "− ÷"	
{ « DUP 'LASTX' STO 4 PICK 4 ROLLD − 1 SF » « »	F4 = −
« DUP 'LASTX' STO 4 PICK 4 ROLLD / 1 SF » } }	Rs-F4= ÷
{ "0 1"	
{ « 1 FS?C {4 ROLL} IFT DROP 0 » « »	F5 = **0** (uses Flag 1
« 1 FS?C {4 ROLL} IFT DROP 1 » } }	Rs-F5= **1** and clears it)
{ "+ x"	
{ « DUP 'LASTX' STO 4 PICK 4 ROLLD + 1 SF » « »	F6 = +
« DUP 'LASTX' STO 4 PICK 4 ROLLD * 1 SF » } }	rs-F6= **x**
} TMENU	Display menu
»	

The unshifted functions are used in Table 2.5.1, along with `x≷y` .

Example

Consider **B000** in Table 2.5.1 which has a **6** key solution:
`CLx` `↑` `↑` `R↓` `R↓` `R↓`
Try the above program using this **5** key sequence:
`↑` `−` `R↓` `−` `−`, i.e.
rs-F3 (set stack to ABCD), F2, F4, F1, F4, F4

Now you should see a B000 stack, but the "B" is an algebraic expression: 'C-(C-B)'. If you now execute COLLECT (in the ALGEBRA menu, accessed directly on the HP48, and via SYMB on the HP49) you indeed see 'B' as required. However, I couldn't allow this shorter solution to be published because of possible roundoff error when the A,B,C, D are real numbers. For example, on a 10 digit machine with B=E-10 and C=1 then this tiny B would get lost in such an expression. Similarly I couldn't assume (1+A)-1 to be certain of always equalling A. Indeed none of the published solutions should require a COLLECT. I also avoided assuming 'A'/'A'=1 which is only true symbolically if A is non-zero – which is probably why ÷ doesn't appear in any final solutions (I only allowed division by 1, and it didn't really help much).

While reading this PDF file try this: CTRL+F b000 ENTER and you will see an entry showing a **5** step and a **4** step solution. CTRL+F ENTER again takes you to section 0.1.1 showing that the 5 step solution is indeed one of the 10 that are shorter than in Table 2.5.1 (due to `x` being used here in the LH column). CTRL+F again shows the 4 step solution is one of the 265 shortenings due to using `R↑` and LSTX. In fact it resurrects the original Table 2.5.1 solution, replacing the 3 `R↓` with 1 `R↑`.

XYZT	Keystrokes	
0000	CLx ↑ ↑ ↑	
0001	1 ↑ CLx ↑ ↑	
000A	0 ↑ ↑	
000B	CLx ↑ ↑	
000C	R↓ CLx ↑ ↑	CLx × LSTx LSTx
000D	R↓ R↓ CLx ↑ ↑	R↑ 0 ↑ ↑
0010	CLx ↑ ↑ 1 x≷y ↑	CLx × 1 LSTx LSTx
0011	1 ↑ ↑ CLx ↑	
001A	1 ↑ CLx ↑	
001B	1 x≷y CLx ↑	
001C	CLx 1 x≷y CLx ↑	CLx × 1 x≷y LSTx
001D	R↓ R↓ 1 x≷y CLx ↑	R↑ 1 ↑ CLx ↑
00A0	0 ↑ ↑ R↓	
00A1	1 x≷y 0 ↑	
00AA	↑ ↑ CLx ↑	
00AB	0 ↑	
00AC	x≷y CLx ↑	
00AD	x≷y R↓ x≷y CLx ↑	R↑ x≷y 0 ↑
00B0	CLx ↑ ↑ R↓	
00B1	CLx ↑ ↑ 1 R↓	
00BA	x≷y 0 ↑	
00BB	CLx ↑ ↑ −	
00BC	CLx ↑	
00BD	R↓ x≷y CLx ↑	
00C0	R↓ CLx ↑ ↑ R↓	0 R↑ 0 ↑
00C1	CLx x≷y 1 R↓ CLx	1 R↑ 0 ↑
00CA	↑ R↓ R↓ CLx ↑	↑ R↑ 0 ↑
00CB	R↓ x≷y 0 ↑	
00CC	CLx x≷y ↑ −	
00CD	CLx x≷y CLx	CLx × LSTx
00D0	CLx R↓ R↓ CLx ↑	CLx R↑ 0 ↑
00D1	R↓ 1 R↓ R↓ CLx ↑	R↓ 1 R↑ 0 ↑
00DA	R↓ R↓ CLx ↑	R↑ 0 ↑
00DB	x≷y R↓ R↓ CLx ↑	CLx R↑ x≷y ↑
00DC	R↓ R↓ x≷y 0 ↑	CLx × R↑ x≷y LSTx
00DD	− CLx x≷y CLx	CLx × × LSTx

XYZT	Keystrokes	
0100	[CLx] [↑] [↑] [↑] [1] [x≷y]	[CLx] [x] [LSTx] [1] [LSTx]
0101	[1] [↑] [↑] [CLx] [x≷y] [0]	[CLx] [−] [1] [LSTx] [1] [LSTx]
010A	[0] [↑] [↑] [1] [x≷y]	[x≷y] [0] [x] [1] [LSTx]
010B	[CLx] [↑] [↑] [1] [x≷y]	[0] [x] [1] [LSTx]
010C	[CLx] [x≷y] [1] [x≷y] [CLx]	[CLx] [x] [1] [LSTx]
010D	[R↓] [CLx] [x≷y] [1] [x≷y] [CLx]	[R↓] [CLx] [x] [1] [LSTx]
0110	[CLx] [↑] [1] [↑] [↑] [CLx]	[CLx] [x] [1] [↑] [LSTx]
0111	[1] [↑] [↑] [↑] [−]	
011A	[1] [↑] [↑] [CLx]	
011B	[CLx] [1] [↑] [↑] [CLx]	[CLx] [x≷y] [1] [↑] [R↑]
011C	[CLx] [x] [1] [x≷y] [1] [x≷y]	[0] [R↑] [1] [↑] [R↑]
011D	[R↓] [1] [R↓] [−] [CLx] [x≷y] [R↓]	[CLx] [R↑] [1] [↑] [R↑]
01A0	[1] [↑] [CLx] [↑] [R↓]	
01A1	[1] [↑] [↑] [R↓] [CLx]	
01AA	[1] [↑] [↑] [−]	
01AB	[1] [↑] [CLx]	
01AC	[x≷y] [1] [x≷y] [CLx]	
01AD	[x≷y] [R↓] [x≷y] [1] [x≷y] [CLx]	[R↑] [x≷y] [1] [R↑] [CLx]
01B0	[CLx] [x≷y] [1] [↑] [CLx]	
01B1	[1] [↑] [R↓] [x≷y] [CLx]	
01BA	[x≷y] [1] [↑] [CLx]	
01BB	[1] [x≷y] [↑] [−]	
01BC	[1] [x≷y] [CLx]	
01BD	[R↓] [x≷y] [1] [x≷y] [CLx]	
01C0	[R↓] [1] [x≷y] [CLx] [↑] [R↓]	[CLx] [↑] [R↑] [1] [R↑]
01C1	[CLx] [x] [1] [↑] [R↓] [x≷y]	[1] [R↑] [1] [R↑] [CLx]
01CA	[1] [x≷y] [R↓] [x≷y] [CLx]	[1] [R↑] [x≷y] [0]
01CB	[R↓] [x≷y] [1] [↑] [CLx]	[CLx] [−] [x≷y] [1] [LSTx]
01CC	[R↓] [1] [x≷y] [↑] [−]	
01CD	[CLx] [x] [1] [x≷y]	
01D0	[CLx] [R↓] [CLx] [x] [1] [x≷y]	[CLx] [x] [R↑] [1] [LSTx]
01D1	[R↓] [CLx] [x] [1] [↑] [R↓] [x≷y]	[CLx] [R↑] [1] [x≷y] [1] [R↑]
01DA	[R↓] [CLx] [x] [1] [x≷y]	[R↑] [1] [R↑] [CLx]
01DB	[x≷y] [R↓] [CLx] [x] [1] [x≷y]	[CLx] [R↑] [x≷y] [1] [x≷y]
01DC	[R↓] [R↓] [x≷y] [1] [↑] [CLx]	[CLx] [R↑] [R↑] [x≷y] [1] [R↑]
01DD	[CLx] [x] [x] [1] [x≷y]	[R↑] [1] [↑] [↑] [−]

XYZT	Keystrokes										
0A00	R↓	CLx	R↓	CLx	x						
0A01	1	x≷y	0	x≷y	0						
0A0A	↑	↑	CLx	x≷y	0						
0A0B	0	x≷y	0								
0A0C	x≷y	CLx	x≷y	0							
0A0D	R↓	CLx	R↓	CLx	x≷y	R↓		R↑	0	↑	R↑	x≷y
0A10	1	x≷y	0	↑	R↓			↑	−	1	LSTx	0
0A11	1	↑	↑	R↓	−			R↑	1	↑	R↑	0
0A1A	↑	↑	1	x≷y	0						
0A1B	1	x≷y	0								
0A1C	x≷y	R↓	1	x≷y	0			R↑	R↑	1	R↑	0
0A1D	R↓	R↓	CLx	x≷y	1	R↓	R↓	R↑	x≷y	1	x≷y	0
0AA0	↑	↑	CLx	↑	R↓						
0AA1	1	x≷y	↑	↑	CLx			↑	R↑	1	R↓	CLx
0AAA	↑	↑	↑	−							
0AAB	↑	↑	CLx								
0AAC	x≷y	R↓	↑	↑	CLx			↑	R↑	0	x≷y	R↓
0AAD	R↓	−	CLx	x≷y	R↓						
0AB0	0	↑	R↓								
0AB1	0	↑	1	R↓				R↑	1	R↓	CLx	
0ABA	↑	↑	R↓	CLx							
0ABB	↑	↑	−								
0ABC	0										
0ABD	R↓	R↓	CLx	x≷y	R↓			R↑	0	x≷y	R↓	
0AC0	x≷y	CLx	↑	R↓							
0AC1	x≷y	1	R↓	CLx							
0ACA	↑	R↓	x≷y	CLx							
0ACB	x≷y	0	x≷y	R↓							
0ACC	x≷y	↑	−								
0ACD	x≷y	CLx									
0AD0	x≷y	CLx	R↓	x≷y	CLx			R↑	x≷y	0	↑	R↓
0AD1	x≷y	R↓	x≷y	1	R↓	CLx		−	1	R↑	LSTx	0
0ADA	R↓	−	R↓	x≷y	0			R↓	−	CLx	R↑	x≷y
0ADB	x≷y	R↓	x≷y	CLx				R↑	x≷y	0		
0ADC	x≷y	R↓	x≷y	0	x≷y	R↓		−	R↓	x≷y	LSTx	0
0ADD	x≷y	R↓	x≷y	↑	−			R↑	↑	↑	R↓	−

XYZT	Keystrokes	
0B00	$\boxed{0}$ $\boxed{\uparrow}$ $\boxed{R\downarrow}$ $\boxed{x}$	
0B01	$\boxed{CLx}$ $\boxed{x\gtrless y}$ $\boxed{0}$ $\boxed{\uparrow}$ $\boxed{1}$ $\boxed{R\downarrow}$	$\boxed{1}$ $\boxed{R\uparrow}$ $\boxed{CLx}$ $\boxed{R\uparrow}$ $\boxed{0}$
0B0A	$\boxed{x\gtrless y}$ $\boxed{0}$ $\boxed{x\gtrless y}$ $\boxed{0}$	
0B0B	$\boxed{CLx}$ $\boxed{x\gtrless y}$ $\boxed{\uparrow}$ $\boxed{\uparrow}$ $\boxed{R\downarrow}$ $\boxed{CLx}$	$\boxed{CLx}$ $\boxed{\uparrow}$ $\boxed{\uparrow}$ $\boxed{-}$ $\boxed{R\uparrow}$ $\boxed{x\gtrless y}$
0B0C	$\boxed{CLx}$ $\boxed{x\gtrless y}$ $\boxed{0}$	
0B0D	$\boxed{R\downarrow}$ $\boxed{x\gtrless y}$ $\boxed{CLx}$ $\boxed{x\gtrless y}$ $\boxed{0}$	$\boxed{R\uparrow}$ $\boxed{0}$ $\boxed{R\uparrow}$ $\boxed{0}$
0B10	$\boxed{CLx}$ $\boxed{x\gtrless y}$ $\boxed{1}$ $\boxed{x\gtrless y}$ $\boxed{0}$	
0B11	$\boxed{\uparrow}$ $\boxed{\uparrow}$ $\boxed{1}$ $\boxed{R\downarrow}$ $\boxed{-}$	$\boxed{1}$ $\boxed{\uparrow}$ $\boxed{R\uparrow}$ $\boxed{0}$
0B1A	$\boxed{x\gtrless y}$ $\boxed{1}$ $\boxed{x\gtrless y}$ $\boxed{0}$	
0B1B	$\boxed{x\gtrless y}$ $\boxed{\uparrow}$ $\boxed{\uparrow}$ $\boxed{1}$ $\boxed{x\gtrless y}$ $\boxed{0}$	
0B1C	$\boxed{R\downarrow}$ $\boxed{1}$ $\boxed{x\gtrless y}$ $\boxed{0}$	
0B1D	$\boxed{R\downarrow}$ $\boxed{x\gtrless y}$ $\boxed{R\downarrow}$ $\boxed{1}$ $\boxed{x\gtrless y}$ $\boxed{0}$	$\boxed{R\uparrow}$ $\boxed{1}$ $\boxed{R\uparrow}$ $\boxed{0}$
0BA0	$\boxed{x\gtrless y}$ $\boxed{0}$ $\boxed{\uparrow}$ $\boxed{R\downarrow}$	
0BA1	$\boxed{x\gtrless y}$ $\boxed{0}$ $\boxed{\uparrow}$ $\boxed{1}$ $\boxed{R\downarrow}$	
0BAA	$\boxed{\uparrow}$ $\boxed{\uparrow}$ $\boxed{R\downarrow}$ $\boxed{-}$	
0BAB	$\boxed{x\gtrless y}$ $\boxed{\uparrow}$ $\boxed{\uparrow}$ $\boxed{R\downarrow}$ $\boxed{CLx}$	$\boxed{\uparrow}$ $\boxed{\uparrow}$ $\boxed{-}$ $\boxed{R\uparrow}$ $\boxed{x\gtrless y}$
0BAC	$\boxed{x\gtrless y}$ $\boxed{0}$	
0BAD	$\boxed{x\gtrless y}$ $\boxed{R\downarrow}$ $\boxed{R\downarrow}$ $\boxed{CLx}$ $\boxed{x\gtrless y}$ $\boxed{R\downarrow}$	$\boxed{R\uparrow}$ $\boxed{x\gtrless y}$ $\boxed{0}$ $\boxed{R\uparrow}$ $\boxed{x\gtrless y}$
0BB0	$\boxed{CLx}$ $\boxed{\uparrow}$ $\boxed{\uparrow}$ $\boxed{-}$ $\boxed{R\downarrow}$	
0BB1	$\boxed{1}$ $\boxed{\uparrow}$ $\boxed{x}$ $\boxed{R\downarrow}$ $\boxed{CLx}$	
0BBA	$\boxed{x\gtrless y}$ $\boxed{\uparrow}$ $\boxed{\uparrow}$ $\boxed{CLx}$	
0BBB	$\boxed{\uparrow}$ $\boxed{\uparrow}$ $\boxed{-}$ $\boxed{x}$	
0BBC	$\boxed{R\downarrow}$ $\boxed{\uparrow}$ $\boxed{\uparrow}$ $\boxed{CLx}$	$\boxed{CLx}$ $\boxed{-}$ $\boxed{\uparrow}$ $\boxed{LSTx}$
0BBD	$\boxed{CLx}$ $\boxed{R\downarrow}$ $\boxed{R\downarrow}$ $\boxed{CLx}$ $\boxed{-}$ $\boxed{R\downarrow}$	$\boxed{CLx}$ $\boxed{R\uparrow}$ $\boxed{0}$ $\boxed{-}$ $\boxed{R\downarrow}$
0BC0	$\boxed{CLx}$ $\boxed{\uparrow}$ $\boxed{R\downarrow}$	
0BC1	$\boxed{1}$ $\boxed{R\downarrow}$ $\boxed{CLx}$	
0BCA	$\boxed{\uparrow}$ $\boxed{R\downarrow}$ $\boxed{CLx}$	
0BCB	$\boxed{CLx}$ $\boxed{x\gtrless y}$ $\boxed{\uparrow}$ $\boxed{R\downarrow}$ $\boxed{x\gtrless y}$	
0BCC	$\boxed{\uparrow}$ $\boxed{-}$	
0BCD	$\boxed{CLx}$	
0BD0	$\boxed{CLx}$ $\boxed{R\downarrow}$ $\boxed{x\gtrless y}$ $\boxed{CLx}$	
0BD1	$\boxed{CLx}$ $\boxed{1}$ $\boxed{R\downarrow}$ $\boxed{x\gtrless y}$ $\boxed{CLx}$	
0BDA	$\boxed{R\downarrow}$ $\boxed{x\gtrless y}$ $\boxed{CLx}$	
0BDB	$\boxed{R\downarrow}$ $\boxed{\uparrow}$ $\boxed{R\downarrow}$ $\boxed{x\gtrless y}$ $\boxed{CLx}$	
0BDC	$\boxed{R\downarrow}$ $\boxed{x\gtrless y}$ $\boxed{0}$ $\boxed{x\gtrless y}$ $\boxed{R\downarrow}$	
0BDD	$\boxed{R\downarrow}$ $\boxed{x\gtrless y}$ $\boxed{\uparrow}$ $\boxed{-}$	

XYZT	Keystrokes	
0C00	[CLx] [↑] [R↓] [×]	
0C01	[CLx] [↑] [R↓] [×] [1] [R↓]	[1] [x≷y] [CLx] [R↑] [0]
0C0A	[0] [R↓] [R↓] [CLx]	[0] [R↑] [0]
0C0B	[CLx] [↑] [R↓] [x≷y] [R↓]	[CLx] [↑] [R↑] [x≷y]
0C0C	[↑] [−] [×] [x≷y] [0]	[↑] [−] [×] [x≷y] [LSTx]
0C0D	[R↓] [CLx] [x≷y] [0]	[CLx] [×] [x≷y] [LSTx]
0C10	[1] [R↓] [CLx] [R↓] [CLx]	[CLx] [↑] [1] [R↑] [0]
0C11	[1] [R↓] [CLx] [×]	
0C1A	[1] [R↓] [R↓] [CLx]	[1] [R↑] [0]
0C1B	[CLx] [x≷y] [1] [R↓] [R↓]	[x≷y] [1] [R↑] [0]
0C1C	[↑] [−] [×] [x≷y] [1] [R↓] [R↓]	[1] [R↑] [↑] [↑] [R↓] [CLx]
0C1D	[R↓] [R↓] [1] [x≷y] [0]	
0CA0	[↑] [R↓] [CLx] [R↓] [CLx]	[0] [x≷y] [R↑] [0]
0CA1	[1] [x≷y] [R↓] [R↓] [CLx]	[1] [x≷y] [R↑] [0]
0CAA	[↑] [R↓] [CLx] [×]	[↑] [R↑] [0]
0CAB	[R↓] [R↓] [x≷y] [CLx]	[0] [R↑] [x≷y]
0CAC	[R↓] [R↓] [↑] [R↓] [x≷y] [CLx]	[x≷y] [↑] [−] [R↑] [x≷y]
0CAD	[x≷y] [R↓] [x≷y] [0]	
0CB0	[R↓] [x≷y] [0] [↑] [R↓]	
0CB1	[1] [R↓] [R↓] [x≷y] [0]	[x≷y] [1] [x≷y] [R↑] [0]
0CBA	[x≷y] [R↓] [R↓] [x≷y] [CLx]	[x≷y] [0] [R↑] [x≷y]
0CBB	[CLx] [x≷y] [↑] [R↓] [R↓]	[x≷y] [↑] [R↑] [0]
0CBC	[↑] [−] [R↓] [x≷y] [0]	[↑] [−] [R↑] [x≷y]
0CBD	[R↓] [x≷y] [0]	
0CC0	[↑] [−] [R↓] [CLx]	
0CC1	[↑] [−] [×] [1] [R↓]	
0CCA	[0] [−] [R↓] [CLx]	
0CCB	[↑] [−] [x≷y] [R↓]	
0CCC	[↑] [−] [×]	
0CCD	[R↓] [R↓] [↑] [↑] [CLx]	[CLx] [R↑] [R↑] [↑] [R↑]
0CD0	[CLx] [R↓] [CLx]	
0CD1	[CLx] [×] [1] [R↓]	
0CDA	[R↓] [CLx]	
0CDB	[CLx] [x≷y] [R↓]	
0CDC	[R↓] [CLx] [x≷y] [↑] [R↓] [x≷y]	
0CDD	[CLx] [×]	

XYZT	Keystrokes	
0D00	CLx R↓ CLx x	
0D01	CLx R↓ CLx x 1 R↓	
0D0A	x≷y CLx R↓ R↓ CLx	x≷y CLx *R↑* 0
0D0B	CLx R↓ R↓ CLx	CLx *R↑* 0
0D0C	CLx R↓ CLx x≷y R↓	CLx x *R↑* *LSTx*
0D0D	− R↓ CLx x≷y 0	CLx x x x≷y *LSTx*
0D10	CLx 1 R↓ CLx R↓ CLx	CLx x 1 *R↑* *LSTx*
0D11	R↓ 1 R↓ CLx x	
0D1A	x≷y R↓ 1 R↓ R↓ CLx	*R↑* 1 x≷y 0
0D1B	R↓ 1 R↓ R↓ CLx	R↓ 1 *R↑* 0
0D1C	R↓ CLx x≷y 1 R↓ R↓	R↓ x≷y 1 *R↑* 0
0D1D	− R↓ R↓ 1 x≷y 0	*R↑* ↑ ↑ 1 x≷y 0
0DA0	R↓ CLx R↓ CLx	*R↑* 0 ↑ R↓
0DA1	R↓ CLx x 1 R↓	
0DAA	R↓ CLx x	
0DAB	R↓ R↓ CLx	*R↑* 0
0DAC	R↓ CLx x≷y R↓	
0DAD	R↓ R↓ CLx x≷y ↑ R↓ x≷y	*R↑* ↑ ↑ R↓ CLx
0DB0	CLx x≷y R↓ R↓ CLx	CLx x≷y *R↑* 0
0DB1	CLx x≷y R↓ x 1 R↓	CLx *R↑* x≷y 1 R↓
0DBA	x≷y R↓ R↓ CLx	x≷y *R↑* 0
0DBB	x≷y R↓ CLx x	
0DBC	CLx R↓ R↓ R↓ x≷y	CLx *R↑* x≷y
0DBD	CLx − R↓ CLx x≷y R↓	CLx *R↑* ↑ R↓ x≷y
0DC0	CLx R↓ R↓ x≷y 0	CLx x x≷y *R↑* *LSTx*
0DC1	R↓ 1 R↓ R↓ x≷y 0	− CLx *R↑* x≷y 1 R↓
0DCA	R↓ R↓ x≷y 0	
0DCB	x≷y R↓ R↓ x≷y 0	R↓ x≷y 0 *R↑* x≷y
0DCC	x x≷y R↓ CLx x	
0DCD	− R↓ x≷y 0	− CLx *R↑* x≷y
0DD0	− CLx R↓ CLx	
0DD1	CLx x x 1 R↓	
0DDA	x≷y CLx − R↓ CLx	*R↑* ↑ ↑ CLx
0DDB	CLx − R↓ CLx	
0DDC	− CLx x≷y R↓	
0DDD	CLx x x	

XYZT	Keystrokes	
1000	[CLx] [↑] [↑] [↑] [1]	
1001	[CLx] [↑] [↑] [1] [↑] [R↓]	
100A	[0] [↑] [↑] [1]	
100B	[CLx] [↑] [↑] [1]	
100C	[R↓] [CLx] [↑] [↑] [1]	[CLx] [×] *LSTx* [1]
100D	[R↓] [R↓] [CLx] [↑] [↑] [1]	*R↑* [0] [↑] [↑] [1]
1010	[CLx] [↑] [↑] [1] [x≷y] [1]	[CLx] [×] [1] *LSTx* [1]
1011	[1] [↑] [↑] [↑] [CLx] [x≷y]	[CLx] *R↑* [1] [↑] *R↑* [1]
101A	[1] [↑] [↑] [CLx] [x≷y]	
101B	[CLx] [↑] [1] [x≷y] [1]	
101C	[CLx] [×] [1] [x≷y] [1]	
101D	[R↓] [CLx] [×] [1] [x≷y] [1]	*R↑* [1] [↑] [↑] [CLx] [x≷y]
10A0	[0] [x≷y] [0] [↑] [1]	
10A1	[0] [↑] [1] [↑] [R↓]	
10AA	[↑] [↑] [CLx] [↑] [1]	
10AB	[0] [↑] [1]	
10AC	[x≷y] [CLx] [↑] [1]	
10AD	[x≷y] [R↓] [x≷y] [CLx] [↑] [1]	*R↑* [x≷y] [0] [↑] [1]
10B0	[CLx] [x≷y] [0] [↑] [1]	
10B1	[CLx] [↑] [1] [↑] [R↓]	
10BA	[x≷y] [0] [↑] [1]	
10BB	[CLx] [↑] [↑] [1] [+]	
10BC	[CLx] [↑] [1]	
10BD	[R↓] [x≷y] [CLx] [↑] [1]	[CLx] *R↑* [1] [x≷y] [R↓]
10C0	[CLx] [↑] [R↓] [×] [1]	[CLx] [×] [1] *LSTx* [R↓]
10C1	[CLx] [×] [1] [↑] [R↓]	
10CA	[↑] [R↓] [CLx] [×] [1]	[0] *R↑* [x≷y] [1]
10CB	[CLx] [x≷y] [1] [x≷y] [R↓]	
10CC	[↑] [−] [×] [1]	
10CD	[CLx] [×] [1]	
10D0	[CLx] [R↓] [CLx] [×] [1]	
10D1	[R↓] [CLx] [×] [1] [↑] [R↓]	[CLx] *R↑* [x≷y] [1] [↑] [R↓]
10DA	[R↓] [CLx] [×] [1]	
10DB	[x≷y] [R↓] [CLx] [×] [1]	[CLx] *R↑* [x≷y] [1]
10DC	[R↓] [CLx] [x≷y] [1] [x≷y] [R↓]	[−] [CLx] *R↑* [x≷y] [1]
10DD	[CLx] [×] [×] [1]	

XYZT	Keystrokes	
1100	[CLx] [↑] [↑] [1] [↑]	
1101	[CLx] [↑] [1] [↑] [↑] [R↓]	
110A	[0] [↑] [1] [↑]	
110B	[CLx] [↑] [1] [↑]	
110C	[CLx] [×] [1] [↑]	
110D	[R↓] [CLx] [×] [1] [↑]	[CLx] [R↑] [x≷y] [1] [↑]
1110	[CLx] [↑] [1] [↑] [↑]	
1111	[1] [↑] [↑] [↑]	
111A	[1] [↑] [↑]	
111B	[R↓] [1] [↑] [↑]	
111C	[R↓] [R↓] [1] [↑] [↑]	
111D	[R↓] [R↓] [R↓] [1] [↑] [↑]	[R↑] [1] [↑] [↑]
11A0	[0] [x≷y] [1] [↑]	
11A1	[1] [↑] [↑] [R↓]	
11AA	[↑] [↑] [1] [↑]	
11AB	[1] [↑]	
11AC	[x≷y] [R↓] [1] [↑]	
11AD	[R↓] [R↓] [R↓] [x≷y] [1] [↑]	[R↑] [x≷y] [1] [↑]
11B0	[CLx] [x≷y] [1] [↑]	
11B1	[R↓] [1] [↑] [↑] [R↓]	
11BA	[x≷y] [1] [↑]	
11BB	[R↓] [1] [↑] [↑] [×]	
11BC	[R↓] [1] [↑]	
11BD	[R↓] [x≷y] [R↓] [1] [↑]	[R↑] [↑] [R↑] [1] [↑]
11C0	[R↓] [CLx] [x≷y] [1] [↑]	[0] [R↑] [1] [↑]
11C1	[R↓] [R↓] [1] [↑] [↑] [R↓]	[1] [R↑] [1] [↑]
11CA	[x≷y] [R↓] [x≷y] [1] [↑]	[↑] [R↑] [1] [↑]
11CB	[R↓] [x≷y] [1] [↑]	
11CC	[R↓] [R↓] [1] [↑] [↑] [×]	
11CD	[R↓] [R↓] [1] [↑]	
11D0	[CLx] [R↓] [R↓] [R↓] [1] [↑]	[CLx] [R↑] [1] [↑]
11D1	[R↓] [R↓] [R↓] [1] [↑] [↑] [R↓]	[R↑] [1] [↑] [↑] [R↓]
11DA	[R↓] [R↓] [R↓] [1] [↑]	[R↑] [1] [↑]
11DB	[x≷y] [R↓] [R↓] [R↓] [1] [↑]	[x≷y] [R↑] [1] [↑]
11DC	[R↓] [R↓] [x≷y] [1] [↑]	
11DD	[−] [R↓] [R↓] [1] [↑]	[R↑] [1] [↑] [↑] [×]

XYZT	Keystrokes
1A00	[0] [x≷y] [1] [↑] [x] [↑] [−] [↑] [LSTx] [1]
1A01	[0] [x≷y] [1] [↑] [R↓]
1A0A	[↑] [↑] [CLx] [x≷y] [1]
1A0B	[0] [x≷y] [1]
1A0C	[x≷y] [CLx] [x≷y] [1]
1A0D	[x≷y] [R↓] [x≷y] [CLx] [x≷y] [1] [R↑] [x≷y] [0] [x≷y] [1]
1A10	[0] [x≷y] [1] [x≷y] [1] [↑] [−] [1] [LSTx] [1]
1A11	[1] [↑] [↑] [R↓] [R↓] [R↑] [1] [↑] [R↑] [1]
1A1A	[↑] [↑] [1] [x≷y] [1]
1A1B	[1] [x≷y] [1]
1A1C	[x≷y] [R↓] [1] [x≷y] [1] [R↑] [R↑] [1] [R↑] [1]
1A1D	[R↓] [R↓] [R↓] [x≷y] [1] [x≷y] [1] [R↑] [1] [↑] [R↑] [x≷y]
1AA0	[1] [↑] [↑] [−] [R↓] [↑] [−] [LSTx] [LSTx] [1]
1AA1	[↑] [↑] [1] [↑] [R↓]
1AAA	[↑] [↑] [↑] [1]
1AAB	[↑] [↑] [1]
1AAC	[x≷y] [R↓] [↑] [↑] [1] [↑] [R↑] [1] [x≷y] [R↓]
1AAD	[R↓] [−] [R↓] [1] [x≷y] [R↓] [R↑] [x≷y] [↑] [↑] [1]
1AB0	[1] [↑] [CLx] [R↓]
1AB1	[1] [↑] [R↓]
1ABA	[↑] [↑] [1] [x≷y] [R↓]
1ABB	[1] [↑] [x]
1ABC	[1]
1ABD	[R↓] [R↓] [R↓] [1] [x≷y] [R↓] [R↑] [1] [x≷y] [R↓]
1AC0	[x≷y] [1] [x≷y] [CLx] [R↓]
1AC1	[x≷y] [R↓] [1] [↑] [R↓]
1ACA	[↑] [R↓] [x≷y] [R↓] [1] [↑] [R↑] [x≷y] [1]
1ACB	[x≷y] [1] [x≷y] [R↓]
1ACC	[x≷y] [1] [x≷y] [CLx] [−]
1ACD	[x≷y] [R↓] [1]
1AD0	[R↓] [CLx] [R↓] [R↓] [x≷y] [1] [−] [CLx] [R↑] [LSTx] [1]
1AD1	[R↓] [R↓] [R↓] [x≷y] [1] [↑] [R↓] [R↑] [x≷y] [1] [↑] [R↓]
1ADA	[R↓] [−] [R↓] [x≷y] [1]
1ADB	[R↓] [R↓] [R↓] [x≷y] [1] [R↑] [x≷y] [1]
1ADC	[x≷y] [R↓] [x≷y] [1] [x≷y] [R↓] [−] [R↓] [x≷y] [LSTx] [1]
1ADD	[x≷y] [CLx] [−] [x≷y] [CLx] [1] [R↑] [x≷y] [1] [↑] [x]

XYZT	Keystrokes		
1B00	[CLx] [x≷y] [1] [↑] [×]		[0] [↑] [R↑] [1]
1B01	[CLx] [x≷y] [1] [↑] [R↓]		
1B0A	[x≷y] [0] [x≷y] [1]		
1B0B	[x≷y] [↑] [↑] [CLx] [x≷y] [1]		
1B0C	[CLx] [x≷y] [1]		
1B0D	[R↓] [x≷y] [CLx] [x≷y] [1]		[R↑] [0] [R↑] [1]
1B10	[CLx] [x≷y] [1] [x≷y] [1]		
1B11	[R↓] [1] [↑] [↑] [R↓] [R↓]		[1] [↑] [R↑] [1]
1B1A	[x≷y] [1] [x≷y] [1]		
1B1B	[x≷y] [↑] [↑] [1] [x≷y] [1]		
1B1C	[R↓] [1] [x≷y] [1]		
1B1D	[R↓] [x≷y] [R↓] [1] [x≷y] [1]		[R↑] [1] [R↑] [1]
1BA0	[x≷y] [1] [↑] [CLx] [R↓]		
1BA1	[x≷y] [1] [↑] [R↓]		
1BAA	[x≷y] [1] [↑] [×]		
1BAB	[x≷y] [↑] [↑] [1] [x≷y] [R↓]		[1] [↑] [×] [R↑] [x≷y]
1BAC	[x≷y] [1]		
1BAD	[x≷y] [R↓] [R↓] [R↓] [1] [x≷y] [R↓]		[R↑] [x≷y] [1] [R↑] [x≷y]
1BB0	[CLx] [x≷y] [↑] [↑] [1]		
1BB1	[R↓] [↑] [↑] [1] [↑] [R↓]		[1] [↑] [R↑] [↑] [R↑]
1BBA	[x≷y] [↑] [↑] [1]		
1BBB	[R↓] [↑] [↑] [↑] [1]		
1BBC	[R↓] [↑] [↑] [1]		
1BBD	[R↓] [x≷y] [R↓] [↑] [↑] [1]		[R↑] [1] [x≷y] [R↑] [↑] [R↑]
1BC0	[1] [x≷y] [CLx] [R↓]		
1BC1	[R↓] [1] [↑] [R↓]		
1BCA	[1] [x≷y] [R↓]		
1BCB	[R↓] [↑] [↑] [1] [x≷y] [R↓]		[x≷y] [↑] [R↑] [x≷y] [1]
1BCC	[R↓] [1] [↑] [×]		
1BCD	[R↓] [1]		
1BD0	[CLx] [R↓] [x≷y] [R↓] [1]		[CLx] [R↑] [1] [R↑] [x≷y]
1BD1	[R↓] [x≷y] [R↓] [1] [↑] [R↓]		[R↑] [1] [x≷y] [R↑] [1]
1BDA	[R↓] [x≷y] [R↓] [1]		[R↑] [1] [R↑] [x≷y]
1BDB	[R↓] [↑] [R↓] [x≷y] [R↓] [1]		[R↓] [↑] [R↑] [x≷y] [1]
1BDC	[R↓] [x≷y] [1] [x≷y] [R↓]		
1BDD	[CLx] [−] [x≷y] [CLx] [1]		[R↑] [↑] [R↑] [1]

XYZT	Keystrokes	
1C00	[0] [R↓] [−] [R↓] [1]	[CLx] [↑] [R↑] [1]
1C01	[R↓] [CLx] [x≷y] [1] [↑] [R↓]	[0] [R↑] [1] [↑] [R↓]
1C0A	[0] [R↓] [R↓] [R↓] [1]	[0] [R↑] [1]
1C0B	[R↓] [x≷y] [0] [x≷y] [1]	[↑] [−] [R↑] [1]
1C0C	[↑] [−] [×] [x≷y] [1]	
1C0D	[R↓] [CLx] [x≷y] [1]	
1C10	[R↓] [CLx] [x≷y] [1] [x≷y] [1]	[CLx] [↑] [1] [R↑] [1]
1C11	[1] [R↓] [−] [R↓] [1]	[R↓] [1] [↑] [R↑] [1]
1C1A	[1] [R↓] [R↓] [R↓] [1]	[1] [R↑] [1]
1C1B	[R↓] [x≷y] [1] [x≷y] [1]	[x≷y] [1] [R↑] [1]
1C1C	[R↓] [R↓] [↑] [↑] [1] [x≷y] [1]	[1] [R↑] [×] [1] [LSTx] [1]
1C1D	[R↓] [R↓] [1] [x≷y] [1]	
1CA0	[↑] [R↓] [CLx] [R↓] [R↓] [1]	[0] [x≷y] [R↑] [1]
1CA1	[x≷y] [R↓] [x≷y] [1] [↑] [R↓]	[1] [x≷y] [R↑] [1]
1CAA	[↑] [R↓] [R↓] [R↓] [1]	[↑] [R↑] [1]
1CAB	[R↓] [R↓] [x≷y] [R↓] [1]	[1] [R↑] [x≷y]
1CAC	[x≷y] [↑] [−] [R↓] [x≷y] [1]	[1] [R↑] [↑] [R↓] [x≷y]
1CAD	[x≷y] [R↓] [x≷y] [1]	
1CB0	[0] [R↓] [R↓] [x≷y] [1]	[CLx] [x≷y] [1] [R↑] [x≷y]
1CB1	[R↓] [x≷y] [1] [↑] [R↓]	
1CBA	[↑] [R↓] [R↓] [x≷y] [1]	[x≷y] [1] [R↑] [x≷y]
1CBB	[R↓] [x≷y] [1] [↑] [×]	[x≷y] [↑] [R↑] [1]
1CBC	[↑] [−] [R↓] [x≷y] [1]	
1CBD	[R↓] [x≷y] [1]	
1CC0	[↑] [−] [R↓] [R↓] [1]	
1CC1	[R↓] [R↓] [↑] [↑] [1] [↑] [R↓]	[1] [R↑] [↑] [↑] [1]
1CCA	[1] [×] [R↓] [R↓] [1]	[↑] [R↑] [↑] [↑] [1]
1CCB	[R↓] [x≷y] [↑] [↑] [1]	
1CCC	[↑] [−] [×] [1] [+]	
1CCD	[R↓] [R↓] [↑] [↑] [1]	
1CD0	[CLx] [R↓] [R↓] [1]	
1CD1	[R↓] [R↓] [1] [↑] [R↓]	
1CDA	[R↓] [R↓] [1]	
1CDB	[R↓] [1] [x≷y] [R↓]	
1CDC	[R↓] [R↓] [↑] [↑] [1] [x≷y] [R↓]	[R↓] [x≷y] [↑] [R↑] [x≷y] [1]
1CDD	[−] [R↓] [1]	

XYZT	Keystrokes	
1D00	[CLx] [R↓] [−] [R↓] [1]	[CLx] [R↑] [1] [↑] [x]
1D01	[CLx] [R↓] [R↓] [R↓] [1] [↑] [R↓]	[CLx] [R↑] [1] [↑] [R↓]
1D0A	[R↓] [R↓] [CLx] [x≥y] [1]	[x≥y] [CLx] [R↑] [1]
1D0B	[CLx] [R↓] [R↓] [R↓] [1]	[CLx] [R↑] [1]
1D0C	[CLx] [R↓] [R↓] [1] [x≥y] [R↓]	[−] [CLx] [R↑] [1]
1D0D	[−] [R↓] [CLx] [x≥y] [1]	
1D10	[R↓] [1] [R↓] [−] [CLx] [R↓] [x≥y]	[CLx] [R↑] [1] [x≥y] [1]
1D11	[R↓] [1] [R↓] [−] [R↓] [1]	[R↑] [1] [↑] [↑] [R↑] [R↑]
1D1A	[R↓] [R↓] [R↓] [1] [x≥y] [1]	[R↑] [1] [x≥y] [1]
1D1B	[R↓] [1] [R↓] [R↓] [R↓] [1]	[R↓] [1] [R↑] [1]
1D1C	[R↓] [R↓] [x≥y] [1] [x≥y] [1]	[R↓] [x≥y] [1] [R↑] [1]
1D1D	[−] [R↓] [R↓] [1] [x≥y] [1]	[R↑] [↑] [↑] [1] [x≥y] [1]
1DA0	[R↓] [CLx] [R↓] [R↓] [1]	[R↑] [1] [R↑] [CLx] [R↓]
1DA1	[R↓] [R↓] [R↓] [1] [↑] [R↓]	[R↑] [1] [↑] [R↓]
1DAA	[R↓] [−] [R↓] [1]	[R↑] [1] [↑] [x]
1DAB	[R↓] [R↓] [R↓] [1]	[R↑] [1]
1DAC	[R↓] [R↓] [1] [x≥y] [R↓]	
1DAD	[x≥y] [CLx] [−] [x≥y] [R↓] [x≥y] [1]	[R↑] [↑] [↑] [1] [x≥y] [R↓]
1DB0	[CLx] [x≥y] [R↓] [R↓] [R↓] [1]	[CLx] [x≥y] [R↑] [1]
1DB1	[x≥y] [R↓] [R↓] [R↓] [1] [↑] [R↓]	[x≥y] [R↑] [1] [↑] [R↓]
1DBA	[x≥y] [R↓] [R↓] [R↓] [1]	[x≥y] [R↑] [1]
1DBB	[x≥y] [R↓] [−] [R↓] [1]	[R↓] [↑] [R↑] [1]
1DBC	[R↓] [1] [R↓] [R↓] [R↓] [x≥y]	[R↓] [1] [R↑] [x≥y]
1DBD	[CLx] [−] [x≥y] [R↓] [x≥y] [1]	[R↑] [↑] [R↑] [x≥y] [1]
1DC0	[CLx] [R↓] [R↓] [x≥y] [1]	
1DC1	[R↓] [R↓] [x≥y] [1] [↑] [R↓]	
1DCA	[R↓] [R↓] [x≥y] [1]	
1DCB	[x≥y] [R↓] [R↓] [x≥y] [1]	[R↓] [x≥y] [1] [R↑] [x≥y]
1DCC	[R↓] [R↓] [x≥y] [1] [↑] [x]	[R↓] [x≥y] [↑] [R↑] [1]
1DCD	[−] [R↓] [x≥y] [1]	
1DD0	[−] [CLx] [R↓] [R↓] [1]	[CLx] [R↑] [↑] [↑] [1]
1DD1	[−] [R↓] [R↓] [1] [↑] [R↓]	[R↑] [↑] [↑] [1] [↑] [R↓]
1DDA	[R↓] [R↓] [R↓] [↑] [↑] [1]	[R↑] [↑] [↑] [1]
1DDB	[CLx] [−] [R↓] [R↓] [1]	[x≥y] [R↑] [↑] [↑] [1]
1DDC	[−] [R↓] [1] [x≥y] [R↓]	
1DDD	[−] [−] [R↓] [1]	

XYZT	Keystrokes	
A000	R↓ CLx R↓ CLx × R↓	0 ↑ ↑ R↑
A001	1 x≷y 0 x≷y 0 x≷y	1 ↑ CLx ↑ R↑
A00A	↑ ↑ CLx x≷y 0 x≷y	↑ ↑ CLx ↑ R↑
A00B	0 x≷y 0 x≷y	↑ − ↑ LSTx
A00C	x≷y CLx x≷y 0 x≷y	− CLx ↑ LSTx
A00D	R↓ CLx R↓ CLx R↓ R↓	R↑ 0 ↑ R↑
A010	1 x≷y 0 ↑ R↓ x≷y	R↑ 0 × 1 LSTx R↑
A011	1 x≷y ↑ ↑ − x≷y	1 ↑ ↑ CLx R↑
A01A	↑ ↑ 1 x≷y 0 x≷y	1 ↑ ↑ − R↑
A01B	1 x≷y 0 x≷y	
A01C	x≷y R↓ 1 x≷y 0 x≷y	1 R↑ x≷y 0 R↑
A01D	R↓ CLx R↓ R↓ 1 R↓ R↓	R↑ 1 R↑ CLx R↑
A0A0	↑ ↑ CLx ↑ R↓ x≷y	↑ − LSTx 0 LSTx
A0A1	↑ ↑ CLx x≷y 1 R↓	− 1 LSTx 0 LSTx
A0AA	↑ ↑ ↑ CLx x≷y	
A0AB	↑ ↑ CLx x≷y	
A0AC	x≷y R↓ ↑ ↑ CLx x≷y	↑ R↓ x≷y CLx R↑
A0AD	R↓ − CLx x≷y R↓ x≷y	− R↑ LSTx 0 LSTx
A0B0	0 ↑ R↓ x≷y	
A0B1	0 x≷y 1 R↓	
A0BA	0 x≷y ↑ R↓	
A0BB	↑ ↑ − x≷y	
A0BC	0 x≷y	
A0BD	R↓ x≷y CLx R↓ R↓ R↓	R↓ x≷y CLx R↑
A0C0	x≷y CLx ↑ R↓ x≷y	0 R↑ 0 R↑
A0C1	x≷y 1 R↓ CLx x≷y	1 R↑ 0 R↑
A0CA	x≷y CLx x≷y ↑ R↓	↑ R↑ 0 R↑
A0CB	x≷y ↑ R↓ CLx x≷y	
A0CC	x≷y ↑ − x≷y	
A0CD	x≷y CLx x≷y	
A0D0	x≷y CLx R↓ x≷y CLx x≷y	x≷y CLx R↑ 0 R↑
A0D1	x≷y R↓ 1 R↓ x≷y CLx x≷y	R↑ 1 x≷y 0 R↑
A0DA	R↓ − CLx R↓ R↓ R↓	R↓ − CLx R↑
A0DB	x≷y R↓ x≷y CLx x≷y	R↑ x≷y 0 x≷y
A0DC	R↓ CLx R↓ x≷y R↓ R↓	R↑ R↑ x≷y 0 R↑
A0DD	x≷y CLx − x≷y CLx x≷y	R↑ ↑ ↑ CLx R↑

XYZT	Keystrokes	
A100	[1] [x≷y] [0] [↑] [R↓] [R↓]	[0] [↑] [↑] [1] [R↑]
A101	[0] [x≷y] [1] [↑] [R↓] [x≷y]	[↑] [−] [1] [LSTx] [1] [R↓]
A10A	[↑] [↑] [CLx] [x≷y] [1] [x≷y]	[↑] [↑] [−] [1] [LSTx]
A10B	[0] [x≷y] [1] [x≷y]	[↑] [−] [1] [LSTx]
A10C	[x≷y] [CLx] [x≷y] [1] [x≷y]	
A10D	[R↓] [R↓] [1] [R↓] [CLx] [R↓] [R↓]	[R↑] [0] [↑] [1] [R↑]
A110	[1] [↑] [↑] [R↓] [−] [R↓]	[↑] [−] [1] [↑] [LSTx]
A111	[1] [↑] [↑] [R↓] [R↓] [R↓]	[1] [↑] [↑] [R↑]
A11A	[↑] [↑] [1] [x≷y] [1] [x≷y]	[↑] [↑] [1] [↑] [R↑]
A11B	[1] [x≷y] [1] [x≷y]	[x≷y] [1] [↑] [R↑]
A11C	[x≷y] [R↓] [1] [x≷y] [1] [x≷y]	[↑] [R↑] [1] [↑] [R↑]
A11D	[R↓] [R↓] [1] [R↓] [CLx] [−] [R↓]	[R↑] [1] [↑] [R↑]
A1A0	[↑] [↑] [1] [x≷y] [0] [R↓]	[↑] [−] [LSTx] [1] [LSTx]
A1A1	[↑] [↑] [1] [↑] [R↓] [x≷y]	[−] [1] [LSTx] [1] [LSTx]
A1AA	[↑] [↑] [↑] [1] [x≷y]	
A1AB	[↑] [↑] [1] [x≷y]	
A1AC	[x≷y] [R↓] [↑] [↑] [1] [x≷y]	[↑] [R↑] [x≷y] [1] [R↑]
A1AD	[R↓] [−] [x≷y] [R↓] [R↓] [1] [x≷y]	[−] [R↑] [LSTx] [1] [LSTx]
A1B0	[1] [x≷y] [0] [R↓]	
A1B1	[1] [↑] [R↓] [x≷y]	
A1BA	[1] [x≷y] [↑] [R↓]	
A1BB	[1] [↑] [×] [x≷y]	
A1BC	[1] [x≷y]	
A1BD	[R↓] [x≷y] [R↓] [1] [R↓] [R↓] [R↓]	[R↑] [1] [R↑] [x≷y] [R↑]
A1C0	[x≷y] [1] [x≷y] [CLx] [R↓] [x≷y]	[0] [R↑] [1] [R↑]
A1C1	[x≷y] [R↓] [1] [↑] [R↓] [x≷y]	[1] [R↑] [1] [R↑]
A1CA	[↑] [R↓] [x≷y] [R↓] [1] [x≷y]	[↑] [R↑] [1] [R↑]
A1CB	[x≷y] [1] [x≷y] [R↓] [x≷y]	
A1CC	[x≷y] [1] [x≷y] [CLx] [−] [x≷y]	[↑] [R↑] [↑] [↑] [1] [R↑]
A1CD	[x≷y] [R↓] [1] [x≷y]	[R↑] [R↑] [1] [R↑]
A1D0	[R↓] [CLx] [R↓] [R↓] [x≷y] [1] [x≷y]	[x≷y] [CLx] [R↑] [1] [R↑]
A1D1	[R↓] [R↓] [R↓] [x≷y] [1] [↑] [R↓] [x≷y]	[R↑] [1] [x≷y] [1] [R↑]
A1DA	[R↓] [−] [R↓] [x≷y] [1] [x≷y]	[R↓] [−] [R↓] [1] [R↑]
A1DB	[R↓] [R↓] [R↓] [x≷y] [1] [x≷y]	[R↑] [x≷y] [1] [x≷y]
A1DC	[R↓] [R↓] [x≷y] [1] [R↓] [R↓] [R↓]	[R↑] [R↑] [x≷y] [1] [R↑]
A1DD	[x≷y] [CLx] [−] [x≷y] [CLx] [1] [x≷y]	[R↑] [↑] [↑] [1] [R↑]

XYZT	Keystrokes	
AA00	[0] [x≷y] [0] [x≷y] [↑]	[↑] [−] [↑] [LSTx] [LSTx]
AA01	[1] [x≷y] [0] [x≷y] [↑]	
AA0A	[↑] [↑] [CLx] [x≷y] [↑]	[↑] [↑] [−] [LSTx] [LSTx]
AA0B	[0] [x≷y] [↑]	
AA0C	[x≷y] [CLx] [x≷y] [↑]	
AA0D	[R↓] [−] [CLx] [R↓] [R↓]	
AA10	[0] [x≷y] [1] [x≷y] [↑]	[↑] [−] [1] [LSTx] [LSTx]
AA11	[1] [x≷y] [1] [x≷y] [↑]	[−] [1] [↑] [LSTx] [LSTx]
AA1A	[↑] [↑] [1] [x≷y] [↑]	[−] [LSTx] [1] [LSTx] [LSTx]
AA1B	[1] [x≷y] [↑]	
AA1C	[x≷y] [R↓] [1] [x≷y] [↑]	[↑] [R↑] [1] [R↑] [R↑]
AA1D	[R↓] [−] [R↓] [1] [R↓] [R↓]	[−] [R↑] [1] [LSTx] [LSTx]
AAA0	[0] [x≷y] [↑] [↑]	
AAA1	[1] [x≷y] [↑] [↑]	
AAAA	[↑] [↑] [↑]	
AAAB	[↑] [↑]	
AAAC	[x≷y] [R↓] [↑] [↑]	
AAAD	[R↓] [−] [CLx] [−] [R↓]	[R↑] [x≷y] [↑] [↑]
AAB0	[↑] [↑] [CLx] [R↓]	
AAB1	[↑] [↑] [1] [R↓]	
AABA	[↑] [↑] [R↓]	
AABB	[↑] [↑] [CLx] [−]	
AABC	[↑]	
AABD	[R↓] [x≷y] [CLx] [−] [R↓] [R↓]	[R↑] [↑] [R↑] [R↑] [↑]
AAC0	[x≷y] [0] [R↓] [R↓] [↑]	[−] [CLx] [x≷y] [LSTx] [LSTx]
AAC1	[x≷y] [1] [R↓] [R↓] [↑]	
AACA	[x≷y] [R↓] [↑] [↑] [R↓]	[↑] [R↑] [x≷y] [↑]
AACB	[x≷y] [↑] [R↓] [R↓] [↑]	[R↓] [x≷y] [R↑] [↑]
AACC	[x≷y] [↑] [−] [R↓] [↑]	[↑] [R↑] [↑] [R↑] [R↑]
AACD	[x≷y] [R↓] [↑]	
AAD0	[R↓] [−] [CLx] [x≷y] [R↓] [R↓]	[−] [CLx] [R↑] [LSTx] [LSTx]
AAD1	[R↓] [−] [x≷y] [R↓] [R↓] [1] [R↓]	[−] [1] [R↑] [LSTx] [LSTx]
AADA	[R↓] [−] [R↓] [x≷y] [↑]	[R↑] [x≷y] [↑] [↑] [R↓]
AADB	[R↓] [R↓] [R↓] [x≷y] [↑]	[R↑] [x≷y] [↑]
AADC	[R↓] [CLx] [−] [x≷y] [R↓] [R↓]	[−] [R↓] [x≷y] [LSTx] [LSTx]
AADD	[R↓] [−] [R↓] [↑] [R↓] [R↓]	[−] [R↓] [R↓] [LSTx] [LSTx]

XYZT	Keystrokes	
AB00	[0] [↑] [R↓] [R↓]	
AB01	[1] [↑] [CLx] [R↓] [R↓]	[1] [R↑] [CLx] [R↑] [R↑]
AB0A	[↑] [↑] [CLx] [R↓] [R↓]	
AB0B	[↑] [↑] [−] [R↓] [x≷y] [R↓]	[x≷y] [↑] [↑] [CLx] [x≷y] [R↑]
AB0C	[R↓] [R↓] [x≷y] [CLx] [R↓] [R↓]	[↑] [−] [x≷y] [LSTx]
AB0D	[R↓] [R↓] [CLx] [R↓] [R↓]	[R↑] [0] [R↑] [R↑]
AB10	[1] [↑] [R↓] [CLx] [R↓]	[R↑] [1] [R↓] [CLx] [R↓]
AB11	[1] [↑] [R↓] [R↓]	
AB1A	[↑] [↑] [1] [R↓] [R↓]	
AB1B	[1] [↑] [×] [R↓] [x≷y] [R↓]	[x≷y] [↑] [↑] [1] [x≷y] [R↑]
AB1C	[R↓] [R↓] [x≷y] [R↓] [1] [R↓] [R↓]	[1] [R↑] [x≷y] [R↑] [R↑]
AB1D	[R↓] [R↓] [R↓] [1] [R↓] [R↓]	[R↑] [1] [R↑] [R↑]
ABA0	[↑] [↑] [R↓] [CLx] [R↓]	
ABA1	[↑] [↑] [R↓] [R↓] [1] [R↓]	[1] [x≷y] [↑] [R↑] [x≷y]
ABAA	[↑] [↑] [R↓] [R↓]	
ABAB	[↑] [↑] [CLx] [−] [R↓] [x≷y] [R↓]	[↑] [↑] [R↑] [↑] [R↓] [x≷y]
ABAC	[↑] [R↓] [x≷y] [R↓] [R↓] [R↓]	[↑] [R↓] [x≷y] [R↑]
ABAD	[x≷y] [R↓] [R↓] [CLx] [−] [R↓] [x≷y]	[R↑] [x≷y] [↑] [R↑] [x≷y]
ABB0	[↑] [↑] [−] [R↓]	
ABB1	[1] [↑] [×] [R↓]	
ABBA	[↑] [↑] [CLx] [−] [R↓]	[↑] [↑] [R↑] [↑] [R↑]
ABBB	[↑] [↑] [−] [−]	[x≷y] [↑] [↑] [R↑]
ABBC	[x≷y] [↑] [R↓] [R↓] [x≷y] [R↓]	[0] [R↑] [+] [R↓]
ABBD	[R↓] [R↓] [CLx] [−] [R↓]	[R↑] [0] [−] [R↓]
ABC0	[0] [R↓]	
ABC1	[1] [R↓]	
ABCA	[↑] [R↓]	
ABCB	[x≷y] [↑] [R↓] [x≷y]	
ABCC	[0] [−]	
ABCD	[x≷y] [x≷y]	
ABD0	[R↓] [R↓] [CLx] [x≷y] [R↓] [R↓]	[R↑] [↑] [R↓] [CLx] [R↓]
ABD1	[R↓] [R↓] [R↓] [1] [x≷y] [R↓] [R↓]	[R↑] [1] [x≷y] [R↑] [R↑]
ABDA	[R↓] [R↓] [x≷y] [R↓] [R↓] [↑] [R↓]	[R↓] [−] [R↓] [LSTx] [R↑]
ABDB	[R↓] [R↓] [CLx] [−] [R↓] [x≷y] [R↓]	[x≷y] [R↓] [−] [R↓] [x≷y] [LSTx]
ABDC	[R↓] [R↓] [x≷y] [R↓] [R↓]	
ABDD	[R↓] [R↓] [R↓] [↑] [R↓] [R↓]	[R↑] [↑] [R↑] [R↑]

XYZT	Keystrokes	
AC00	[x≷y] [CLx] [↑] [R↓] [R↓]	
AC01	[x≷y] [1] [x≷y] [CLx] [R↓] [R↓]	[1] [R↑] [0] [x≷y] [R↑]
AC0A	[x≷y] [0] [R↓] [R↓] [↑] [R↓]	[↑] [R↑] [0] [x≷y] [R↑]
AC0B	[x≷y] [0] [R↓] [R↓]	
AC0C	[x≷y] [↑] [−] [R↓] [x≷y] [R↓]	[x≷y] [↑] [−] [x≷y] [R↑] [x≷y]
AC0D	[R↓] [CLx] [x≷y] [R↓] [R↓] [R↓]	[R↓] [CLx] [x≷y] [R↑]
AC10	[x≷y] [1] [R↓] [CLx] [R↓]	
AC11	[x≷y] [1] [R↓] [CLx] [−]	
AC1A	[x≷y] [1] [R↓] [R↓] [↑] [R↓]	[↑] [R↑] [1] [x≷y] [R↑]
AC1B	[x≷y] [1] [R↓] [R↓]	
AC1C	[x≷y] [1] [R↓] [R↓] [x≷y] [↑] [R↓] [x≷y]	[1] [R↑] [↑] [R↑] [x≷y] [R↓]
AC1D	[R↓] [R↓] [1] [x≷y] [R↓] [R↓] [R↓]	[R↑] [R↑] [1] [x≷y] [R↑]
ACA0	[↑] [R↓] [x≷y] [CLx] [R↓]	
ACA1	[↑] [R↓] [x≷y] [R↓] [1] [R↓]	[↑] [R↑] [x≷y] [1] [R↓]
ACAA	[↑] [R↓] [x≷y] [CLx] [−]	[↑] [R↑] [x≷y] [↑] [R↓]
ACAB	[↑] [R↓] [x≷y] [R↓]	[↑] [R↑] [x≷y]
ACAC	[↑] [R↓] [R↓] [R↓] [↑] [R↓] [x≷y]	[↑] [R↑] [↑] [R↓] [x≷y]
ACAD	[R↓] [CLx] [−] [x≷y] [R↓] [x≷y]	[−] [R↑] [LSTx] [R↑] [LSTx]
ACB0	[x≷y] [↑] [R↓] [CLx] [R↓]	
ACB1	[x≷y] [1] [x≷y] [R↓] [R↓]	
ACBA	[x≷y] [↑] [R↓] [R↓] [↑] [R↓]	[↑] [R↑] [R↑] [x≷y] [R↑]
ACBB	[x≷y] [↑] [R↓] [R↓]	
ACBC	[x≷y] [0] [−] [R↓] [x≷y] [R↓]	[0] [−] [R↑] [x≷y]
ACBD	[R↓] [x≷y] [R↓] [R↓] [R↓]	[R↓] [x≷y] [R↑]
ACC0	[x≷y] [↑] [−] [R↓]	
ACC1	[x≷y] [↑] [−] [R↓] [1] [R↓]	[1] [R↑] [↑] [R↑]
ACCA	[x≷y] [↑] [−] [R↓] [↑] [R↓]	[↑] [R↑] [↑] [R↑]
ACCB	[x≷y] [0] [−] [R↓]	
ACCC	[x≷y] [↑] [−] [−]	
ACCD	[R↓] [R↓] [↑] [R↓] [R↓] [R↓]	[R↑] [R↑] [↑] [R↑]
ACD0	[x≷y] [CLx] [R↓]	
ACD1	[x≷y] [R↓] [1] [R↓]	
ACDA	[x≷y] [R↓] [↑] [R↓]	
ACDB	[x≷y] [R↓]	
ACDC	[x≷y] [R↓] [x≷y] [↑] [R↓] [x≷y]	[R↑] [R↑] [↑] [R↑] [x≷y] [R↓]
ACDD	[x≷y] [CLx] [−]	

XYZT	Keystrokes	
AD00	R↓ CLx R↓ CLx R↓ x≷y	− CLx ↑ *R↑* *LSTx*
AD01	R↓ CLx R↓ R↓ x≷y 1 R↓	*R↑* 1 x≷y 0 x≷y *R↑*
AD0A	R↓ CLx R↓ R↓ x≷y ↑ R↓	R↓ − CLx x≷y *R↑*
AD0B	R↓ x≷y CLx R↓ R↓ x≷y	x≷y *R↑* 0 x≷y *R↑*
AD0C	R↓ CLx R↓ R↓ x≷y	− CLx *R↑* *LSTx*
AD0D	R↓ CLx R↓ R↓ ↑ R↓ x≷y	− R↓ CLx x≷y *LSTx*
AD10	R↓ R↓ 1 R↓ CLx R↓ x≷y	x≷y CLx *R↑* 1 x≷y *R↑*
AD11	R↓ R↓ 1 R↓ CLx − x≷y	*R↑* x≷y 1 ↑ *R↑* *R↑*
AD1A	R↓ R↓ 1 R↓ R↓ x≷y ↑ R↓	− 1 *R↑* *LSTx* *LSTx* R↓
AD1B	R↓ x≷y R↓ 1 R↓ R↓ x≷y	x≷y *R↑* 1 x≷y *R↑*
AD1C	R↓ R↓ 1 R↓ R↓ x≷y	− R↓ 1 *R↑* *LSTx*
AD1D	R↓ R↓ 1 R↓ R↓ ↑ R↓ x≷y	*R↑* ↑ ↑ 1 x≷y *R↑*
ADA0	R↓ − CLx R↓ x≷y	
ADA1	R↓ − R↓ x≷y 1 R↓	
ADAA	R↓ − CLx − x≷y	
ADAB	R↓ x≷y CLx − R↓ x≷y	*R↑* x≷y ↑ R↓ x≷y *R↑*
ADAC	R↓ CLx − R↓ x≷y	x≷y R↓ ↑ *R↑* x≷y
ADAD	R↓ − R↓ ↑ R↓ x≷y	− R↓ R↓ *LSTx* x≷y *LSTx*
ADB0	R↓ R↓ CLx R↓ x≷y	*R↑* x≷y 0 R↓
ADB1	R↓ R↓ R↓ x≷y 1 R↓	*R↑* x≷y 1 R↓
ADBA	R↓ R↓ R↓ x≷y ↑ R↓	*R↑* x≷y ↑ R↓
ADBB	R↓ R↓ CLx − x≷y	*R↑* x≷y 0 −
ADBC	**R↓ R↓ R↓ x≷y**	***R↑* x≷y**
ADBD	R↓ R↓ R↓ ↑ R↓ x≷y	*R↑* ↑ R↓ x≷y
ADC0	R↓ CLx x≷y R↓ R↓ x≷y	− CLx x≷y *R↑* *LSTx*
ADC1	R↓ R↓ 1 x≷y R↓ R↓ x≷y	− 1 R↓ R↓ x≷y *LSTx*
ADCA	R↓ x≷y R↓ R↓ x≷y ↑ R↓	R↓ CLx − x≷y *R↑*
ADCB	**R↓ x≷y R↓ R↓ x≷y**	
ADCC	R↓ R↓ ↑ R↓ R↓ x≷y	x≷y CLx *R↑* + x≷y
ADCD	R↓ x≷y R↓ R↓ ↑ R↓ x≷y	− R↓ x≷y *LSTx*
ADD0	x≷y R↓ x≷y ↑ − R↓	x≷y CLx *R↑* ↑ *R↑*
ADD1	x≷y CLx − x≷y R↓ 1 R↓	*R↑* 1 x≷y ↑ *R↑*
ADDA	R↓ − R↓ ↑ R↓ R↓ R↓	R↓ − R↓ ↑ *R↑*
ADDB	x≷y R↓ R↓ R↓ ↑ R↓ R↓ R↓	x≷y *R↑* ↑ *R↑*
ADDC	x≷y CLx − x≷y R↓	*R↑* *R↑* x≷y ↑ *R↑*
ADDD	x≷y R↓ x≷y ↑ − −	*R↑* ↑ ↑ *R↑*

XYZT	Keystrokes	
B000	`0` `↑` `R↓` `×` `R↓`	`CLx` `↑` `↑` `R↑`
B001	`CLx` `x≷y` `0` `x≷y` `1` `R↓`	`1` `x≷y` `CLx` `↑` `R↑`
B00A	`x≷y` `0` `x≷y` `0` `x≷y`	`0` `↑` `R↑`
B00B	`CLx` `x≷y` `0` `x≷y` `↑` `R↓`	`CLx` `↑` `↑` `−` `R↑`
B00C	`CLx` `x≷y` `0` `x≷y`	
B00D	`R↓` `x≷y` `CLx` `x≷y` `0` `x≷y`	`R↑` `x≷y` `CLx` `↑` `R↑`
B010	`CLx` `x≷y` `1` `x≷y` `0` `x≷y`	`0` `×` `1` `LSTx` `R↑`
B011	`CLx` `x≷y` `1` `↑` `R↓` `R↓`	`1` `↑` `R↑` `0` `x≷y`
B01A	`x≷y` `1` `x≷y` `0` `x≷y`	`1` `R↑` `CLx` `R↑`
B01B	`CLx` `x≷y` `↑` `↑` `1` `R↓` `R↓`	`1` `x≷y` `↑` `−` `R↑`
B01C	`R↓` `1` `x≷y` `0` `x≷y`	
B01D	`R↓` `x≷y` `R↓` `1` `x≷y` `0` `x≷y`	`R↑` `1` `R↑` `0` `x≷y`
B0A0	`x≷y` `0` `↑` `R↓` `x≷y`	`0` `x≷y` `0` `R↑`
B0A1	`x≷y` `0` `x≷y` `1` `R↓`	`1` `x≷y` `0` `R↑`
B0AA	`x≷y` `↑` `↑` `−` `x≷y`	`↑` `↑` `CLx` `R↑`
B0AB	`x≷y` `0` `x≷y` `↑` `R↓`	`↑` `↑` `−` `R↑`
B0AC	`x≷y` `0` `x≷y`	
B0AD	`R↓` `R↓` `CLx` `R↓` `x≷y` `R↓` `R↓`	`R↑` `x≷y` `0` `R↑`
B0B0	`CLx` `x≷y` `↑` `↑` `CLx` `x≷y`	
B0B1	`1` `↑` `×` `R↓` `CLx` `x≷y`	`R↓` `−` `1` `LSTx` `0` `LSTx`
B0BA	`x≷y` `↑` `↑` `CLx` `x≷y`	
B0BB	`↑` `↑` `−` `×` `x≷y`	
B0BC	`R↓` `↑` `↑` `CLx` `x≷y`	
B0BD	`R↓` `x≷y` `R↓` `↑` `↑` `CLx` `x≷y`	`R↓` `↑` `R↓` `x≷y` `CLx` `R↑`
B0C0	`CLx` `↑` `R↓` `x≷y`	
B0C1	`CLx` `x≷y` `1` `R↓`	
B0CA	`↑` `R↓` `CLx` `x≷y`	
B0CB	`CLx` `x≷y` `↑` `R↓`	
B0CC	`↑` `−` `x≷y`	
B0CD	`CLx` `x≷y`	
B0D0	`CLx` `R↓` `x≷y` `CLx` `x≷y`	`CLx` `R↑` `0` `R↑`
B0D1	`R↓` `x≷y` `CLx` `x≷y` `1` `R↓`	`R↓` `1` `R↑` `0` `R↑`
B0DA	`R↓` `x≷y` `CLx` `x≷y`	`R↑` `0` `R↑`
B0DB	`R↓` `x≷y` `CLx` `x≷y` `↑` `R↓`	`R↑` `x≷y` `↑` `−` `R↑`
B0DC	`R↓` `x≷y` `↑` `R↓` `CLx` `x≷y`	
B0DD	`CLx` `−` `x≷y` `CLx` `x≷y`	

XYZT	Keystrokes	
B100	`CLx` `x≷y` `0` `x≷y` `1` `x≷y`	`CLx` `↑` `↑` `1` `R↑`
B101	`CLx` `x≷y` `1` `↑` `R↓` `x≷y`	
B10A	`x≷y` `0` `x≷y` `1` `x≷y`	`0` `↑` `1` `R↑`
B10B	`CLx` `x≷y` `1` `x≷y` `↑` `R↓`	
B10C	`CLx` `x≷y` `1` `x≷y`	
B10D	`R↓` `x≷y` `CLx` `x≷y` `1` `x≷y`	`CLx` `R↑` `x≷y` `1` `R↑`
B110	`↑` `↑` `1` `R↓` `−` `R↓`	`CLx` `↑` `1` `↑` `R↑`
B111	`↑` `↑` `1` `R↓` `−` `−`	`R↓` `1` `↑` `↑` `R↑`
B11A	`x≷y` `1` `x≷y` `1` `x≷y`	`1` `↑` `R↑`
B11B	`x≷y` `↑` `↑` `1` `x≷y` `1` `x≷y`	`1` `↑` `R↑` `↑` `R↓`
B11C	`R↓` `1` `x≷y` `1` `x≷y`	`R↓` `x≷y` `1` `↑` `R↑`
B11D	`R↓` `x≷y` `R↓` `1` `x≷y` `1` `x≷y`	`x≷y` `R↑` `1` `↑` `R↑`
B1A0	`x≷y` `1` `x≷y` `0` `R↓`	`0` `x≷y` `1` `R↑`
B1A1	`x≷y` `1` `↑` `R↓` `x≷y`	`1` `x≷y` `1` `R↑`
B1AA	`x≷y` `1` `↑` `X` `x≷y`	`↑` `↑` `1` `R↑`
B1AB	`x≷y` `1` `x≷y` `↑` `R↓`	`1` `↑` `X` `R↑`
B1AC	`x≷y` `1` `x≷y`	
B1AD	`R↓` `R↓` `R↓` `x≷y` `1` `R↓` `R↓` `R↓`	`R↑` `x≷y` `1` `R↑`
B1B0	`CLx` `x≷y` `↑` `↑` `1` `x≷y`	
B1B1	`x≷y` `↑` `↑` `1` `↑` `R↓` `x≷y`	`R↓` `−` `1` `LSTx` `1` `LSTx`
B1BA	`x≷y` `↑` `↑` `1` `x≷y`	
B1BB	`x≷y` `↑` `↑` `↑` `1` `x≷y`	
B1BC	`R↓` `↑` `↑` `1` `x≷y`	
B1BD	`R↓` `x≷y` `R↓` `↑` `↑` `1` `x≷y`	`R↓` `↑` `R↑` `x≷y` `1` `R↑`
B1C0	`R↓` `1` `x≷y` `0` `R↓`	
B1C1	`R↓` `1` `↑` `R↓` `x≷y`	
B1CA	`1` `x≷y` `R↓` `x≷y`	
B1CB	`R↓` `1` `x≷y` `↑` `R↓`	
B1CC	`↑` `−` `R↓` `1` `x≷y`	
B1CD	`R↓` `1` `x≷y`	
B1D0	`CLx` `R↓` `x≷y` `R↓` `1` `x≷y`	`CLx` `R↑` `1` `R↑`
B1D1	`R↓` `x≷y` `R↓` `1` `↑` `R↓` `x≷y`	`R↓` `1` `R↑` `1` `R↑`
B1DA	`R↓` `x≷y` `R↓` `1` `x≷y`	`R↑` `1` `R↑`
B1DB	`R↓` `x≷y` `R↓` `1` `x≷y` `↑` `R↓`	`R↓` `↑` `R↑` `1` `R↑`
B1DC	`R↓` `x≷y` `1` `x≷y` `R↓` `x≷y`	`R↑` `R↑` `x≷y` `R↑` `1` `x≷y`
B1DD	`CLx` `−` `x≷y` `CLx` `1` `x≷y`	`R↑` `↑` `R↑` `1` `x≷y`

XYZT	Keystrokes	
BA00	x≷y 0 ↑ R↓ R↓	
BA01	x≷y 1 ↑ CLx R↓ R↓	1 x≷y 0 x≷y R↑
BA0A	↑ ↑ R↓ CLx R↓ R↓	↑ ↑ CLx x≷y R↑
BA0B	x≷y ↑ ↑ CLx R↓ R↓	↑ ↑ − x≷y R↑
BA0C	↑ R↓ CLx R↓ x≷y R↓	↑ − x≷y LSTx x≷y
BA0D	R↓ R↓ CLx R↓ R↓ x≷y	x≷y R↑ 0 R↑ R↑
BA10	x≷y 1 ↑ R↓ CLx R↓	↑ − 1 LSTx R↑
BA11	x≷y 1 ↑ R↓ R↓	
BA1A	↑ ↑ 1 R↓ R↓ x≷y	↑ ↑ 1 x≷y R↑
BA1B	x≷y ↑ ↑ 1 R↓ R↓	1 ↑ × x≷y R↑
BA1C	1 x≷y R↓ R↓ x≷y R↓	x≷y 1 R↑ x≷y R↑ R↑
BA1D	R↓ R↓ R↓ 1 R↓ R↓ x≷y	x≷y R↑ 1 R↑ R↑
BAA0	↑ ↑ R↓ − R↓	0 x≷y ↑ R↑
BAA1	x≷y 1 ↑ × R↓	1 x≷y ↑ R↑
BAAA	↑ ↑ R↓ R↓ R↓	↑ ↑ R↑
BAAB	x≷y ↑ ↑ CLx − R↓	↑ ↑ R↑ ↑ R↓
BAAC	↑ R↓ R↓ x≷y R↓	
BAAD	x≷y R↓ R↓ CLx − R↓	R↑ x≷y ↑ R↑
BAB0	↑ ↑ − R↓ x≷y	
BAB1	1 ↑ × R↓ x≷y	
BABA	↑ ↑ CLx − R↓ x≷y	↑ ↑ R↑ ↑ R↑ x≷y
BABB	x≷y ↑ ↑ R↓ R↓	
BABC	x≷y ↑ R↓ x≷y R↓ R↓ R↓	x≷y ↑ R↓ x≷y R↑
BABD	R↓ R↓ CLx − R↓ x≷y	R↑ 0 − R↓ x≷y
BAC0	x≷y 0 R↓	
BAC1	x≷y 1 R↓	
BACA	↑ R↓ x≷y	
BACB	x≷y ↑ R↓	
BACC	x≷y 0 −	
BACD	x≷y	
BAD0	R↓ R↓ CLx x≷y R↓ R↓ x≷y	x≷y R↑ ↑ R↓ CLx R↓
BAD1	R↓ R↓ R↓ 1 x≷y R↓ R↓ x≷y	x≷y R↑ 1 x≷y R↑ R↑
BADA	R↓ R↓ x≷y R↓ R↓ ↑ R↓ x≷y	R↓ − R↓ x≷y LSTx
BADB	R↓ R↓ x≷y R↓ R↓ x≷y ↑ R↓	R↑ x≷y 0 − R↑
BADC	R↓ R↓ x≷y R↓ R↓ x≷y	
BADD	R↓ R↓ R↓ ↑ R↓ R↓ x≷y	x≷y R↑ ↑ R↑ R↑

XYZT	Keystrokes	
BB00	CLx x≷y 0 x≷y ↑	0 ↑ R↑ ↑
BB01	CLx x≷y ↑ ↑ 1 R↓	1 R↑ CLx R↑ ↑
BB0A	x≷y 0 x≷y ↑	
BB0B	CLx x≷y ↑ ↑ R↓	
BB0C	CLx x≷y ↑	
BB0D	R↓ x≷y CLx x≷y ↑	R↑ 0 R↑ ↑
BB10	CLx x≷y 1 x≷y ↑	
BB11	x≷y 1 x≷y 1 x≷y ↑	1 ↑ R↑ ↑
BB1A	x≷y 1 x≷y ↑	
BB1B	R↓ 1 x≷y ↑ ↑ R↓	
BB1C	R↓ 1 x≷y ↑	
BB1D	R↓ x≷y R↓ 1 x≷y ↑	R↑ 1 R↑ ↑
BBA0	x≷y ↑ ↑ CLx R↓	
BBA1	x≷y ↑ ↑ 1 R↓	
BBAA	x≷y ↑ ↑ CLx −	↑ ↑ R↑ ↑
BBAB	x≷y ↑ ↑ R↓	
BBAC	x≷y ↑	
BBAD	R↓ R↓ CLx − x≷y R↓ R↓	R↓ − R↓ x≷y LSTx LSTx
BBB0	CLx x≷y ↑ ↑	
BBB1	x≷y 1 x≷y ↑ ↑	
BBBA	x≷y ↑ ↑	
BBBB	R↓ ↑ ↑ ↑	
BBBC	R↓ ↑ ↑	
BBBD	R↓ x≷y R↓ ↑ ↑	R↑ ↑ R↑ ↑ ↑
BBC0	0 R↓ R↓ ↑	
BBC1	1 R↓ R↓ ↑	
BBCA	↑ R↓ R↓ ↑	
BBCB	R↓ ↑ ↑ R↓	
BBCC	↑ − R↓ ↑	
BBCD	R↓ ↑	
BBD0	CLx R↓ x≷y R↓ ↑	
BBD1	R↓ x≷y 1 R↓ R↓ ↑	R↑ 1 x≷y R↑ ↑
BBDA	R↓ x≷y R↓ ↑	
BBDB	R↓ x≷y R↓ ↑ ↑ R↓	R↓ ↑ R↑ x≷y ↑
BBDC	R↓ x≷y ↑ R↓ R↓ ↑	R↑ R↑ x≷y R↑ ↑
BBDD	CLx − x≷y R↓ ↑	R↑ ↑ R↑ ↑

XYZT	Keystrokes	
BC00	CLx ↑ R↓ R↓	
BC01	1 x⇄y CLx R↓ R↓	
BC0A	0 R↓ R↓	
BC0B	0 R↓ R↓ ↑ R↓	CLx ↑ R↑ + R↑
BC0C	↑ − R↓ x⇄y R↓	
BC0D	CLx R↓ R↓ R↓ x⇄y R↓ R↓	CLx R↑ x⇄y R↑ R↑
BC10	1 R↓ CLx R↓	
BC11	1 R↓ CLx −	
BC1A	1 R↓ R↓	
BC1B	1 R↓ R↓ ↑ R↓	
BC1C	↑ − R↓ x⇄y 1 R↓ R↓	R↓ x⇄y ↑ ↑ 1 x⇄y R↑
BC1D	R↓ 1 R↓ R↓ R↓ x⇄y R↓ R↓	R↑ x⇄y R↓ 1 R↓ R↓
BCA0	↑ R↓ CLx R↓	
BCA1	1 x⇄y R↓ R↓	
BCAA	↑ R↓ R↓	
BCAB	↑ R↓ R↓ ↑ R↓	0 R↑ + R↑
BCAC	0 − R↓ x⇄y R↓	x⇄y 0 − R↑ x⇄y
BCAD	R↓ R↓ R↓ x⇄y R↓ R↓	R↑ x⇄y R↑ R↑
BCB0	R↓ ↑ ↑ R↓ CLx R↓	CLx x⇄y ↑ R↑ x⇄y
BCB1	R↓ ↑ ↑ R↓ R↓ 1 R↓	x⇄y ↑ R↑ 1 R↓ x⇄y
BCBA	x⇄y ↑ R↓ x⇄y R↓	x⇄y ↑ R↑ x⇄y
BCBB	R↓ ↑ ↑ R↓ R↓	
BCBC	↑ − R↓ ↑ R↓ x⇄y R↓	x⇄y ↑ R↑ ↑ R↓ x⇄y
BCBD	R↓ ↑ R↓ x⇄y R↓ R↓ R↓	R↓ ↑ R↓ x⇄y R↑
BCC0	↑ − R↓	
BCC1	↑ − R↓ 1 R↓	x⇄y 1 R↑ ↑ R↑
BCCA	0 − R↓	
BCCB	↑ − R↓ ↑ R↓	x⇄y ↑ R↑ ↑ R↑
BCCC	↑ − −	
BCCD	CLx R↓ R↓ R↓ + R↓	CLx R↑ + R↓
BCD0	CLx R↓	
BCD1	R↓ 1 R↓	
BCDA	R↓	
BCDB	R↓ ↑ R↓	
BCDC	R↓ x⇄y ↑ R↓ x⇄y	
BCDD	CLx −	

XYZT	Keystrokes	
BD00	CLx R↓ x≷y CLx R↓	
BD01	CLx R↓ x≷y R↓ 1 R↓	
BD0A	R↓ R↓ CLx x≷y R↓ R↓ R↓	*R↑* 0 x≷y *R↑*
BD0B	CLx R↓ x≷y R↓ ↑ R↓	CLx *R↑* 0 − *R↑*
BD0C	CLx R↓ x≷y R↓	
BD0D	CLx − R↓ CLx R↓ R↓ x≷y	CLx *R↑* ↑ *R↑* x≷y R↓
BD10	R↓ x≷y 1 R↓ CLx R↓	CLx *R↑* 1 x≷y *R↑*
BD11	R↓ 1 R↓ x≷y CLx −	R↓ 1 R↓ − R↓ *LSTx*
BD1A	R↓ R↓ R↓ 1 x≷y R↓ R↓ R↓	*R↑* 1 x≷y *R↑*
BD1B	R↓ x≷y 1 R↓ R↓ ↑ R↓	R↓ ↑ *R↑* 1 x≷y *R↑*
BD1C	R↓ x≷y 1 R↓ R↓	
BD1D	CLx − R↓ R↓ 1 R↓ R↓ x≷y	CLx *R↑* + 1 *LSTx* *R↑*
BDA0	R↓ x≷y CLx R↓	
BDA1	R↓ x≷y R↓ 1 R↓	
BDAA	R↓ x≷y CLx −	R↓ − R↓ *LSTx*
BDAB	R↓ x≷y R↓ ↑ R↓	*R↑* 0 − *R↑*
BDAC	R↓ x≷y R↓	
BDAD	x≷y R↓ R↓ R↓ ↑ R↓ x≷y	x≷y *R↑* ↑ R↓ x≷y
BDB0	R↓ ↑ R↓ x≷y CLx R↓	
BDB1	R↓ ↑ R↓ x≷y R↓ 1 R↓	*R↑* 1 *R↑* ↑ *R↑* x≷y
BDBA	R↓ R↓ CLx − x≷y R↓ x≷y	R↓ − R↓ *LSTx* x≷y *LSTx*
BDBB	R↓ ↑ R↓ x≷y CLx −	R↓ ↑ *R↑* x≷y ↑ R↓
BDBC	R↓ ↑ R↓ x≷y R↓	R↓ ↑ *R↑* x≷y
BDBD	x≷y R↓ − R↓ ↑ R↓ x≷y	*R↑* ↑ *R↑* ↑ *R↑* x≷y
BDC0	R↓ x≷y ↑ R↓ CLx R↓	CLx *R↑* *R↑* x≷y *R↑*
BDC1	R↓ x≷y 1 x≷y R↓ R↓	
BDCA	R↓ R↓ x≷y R↓ R↓ R↓	*R↑* *R↑* x≷y *R↑*
BDCB	R↓ x≷y ↑ R↓ R↓ ↑ R↓	R↓ ↑ R↓ R↓ x≷y *R↑*
BDCC	R↓ x≷y ↑ R↓ R↓	CLx *R↑* + x≷y
BDCD	CLx − R↓ R↓ R↓ x≷y	CLx − *R↑* x≷y
BDD0	R↓ x≷y ↑ − R↓	CLx *R↑* ↑ *R↑*
BDD1	CLx − x≷y R↓ 1 R↓	R↓ 1 *R↑* ↑ *R↑*
BDDA	R↓ R↓ R↓ ↑ R↓ R↓ R↓	*R↑* ↑ *R↑*
BDDB	CLx − x≷y R↓ ↑ R↓	R↓ ↑ *R↑* ↑ *R↑*
BDDC	CLx − x≷y R↓	
BDDD	R↓ x≷y ↑ − −	x≷y *R↑* ↑ ↑ *R↑*

XYZT	Keystrokes	
C000	CLx ↑ R↓ × R↓	R↓ CLx ↑ ↑ R↑
C001	0 R↓ − R↓ 1 R↓	CLx ↑ R↑ 1 R↓
C00A	0 R↓ R↓ CLx x≷y	x≷y CLx ↑ R↑
C00B	CLx ↑ R↓ R↓ R↓	CLx ↑ R↑
C00C	↑ − R↓ CLx R↓ R↓	CLx ↑ R↑ ↑ R↓
C00D	R↓ CLx x≷y 0 x≷y	
C010	1 R↓ CLx R↓ CLx x≷y	CLx × 1 LSTx R↑
C011	1 R↓ − CLx x≷y	
C01A	1 R↓ R↓ CLx x≷y	1 R↑ 0 x≷y
C01B	x≷y 1 R↓ R↓ CLx x≷y	1 x≷y CLx R↑
C01C	↑ − R↓ R↓ 1 R↓ R↓	R↓ 1 x≷y ↑ − R↑
C01D	R↓ R↓ 1 x≷y 0 x≷y	
C0A0	0 R↓ R↓ CLx R↓	0 R↑ 0 R↓
C0A1	1 x≷y R↓ R↓ CLx x≷y	0 R↑ 1 R↓
C0AA	↑ R↓ R↓ CLx x≷y	↑ R↑ 0 x≷y
C0AB	0 R↓ R↓ R↓	0 R↑
C0AC	x≷y ↑ − R↓ R↓ R↓	x≷y ↑ − R↑
C0AD	x≷y R↓ x≷y 0 x≷y	
C0B0	CLx ↑ R↓ x≷y R↓ R↓	CLx x≷y 0 R↑
C0B1	R↓ x≷y 0 x≷y 1 R↓	↑ − R↑ 1 R↓
C0BA	x≷y 0 R↓ R↓ R↓	x≷y 0 R↑
C0BB	x≷y ↑ R↓ R↓ CLx x≷y	CLx ↑ R↑ +
C0BC	↑ − R↓ R↓ R↓	↑ − R↑
C0BD	R↓ x≷y 0 x≷y	
C0C0	↑ − R↓ CLx x≷y	
C0C1	↑ − × x≷y 1 R↓	
C0CA	0 − R↓ CLx x≷y	
C0CB	↑ − x≷y R↓ x≷y	
C0CC	↑ − × x≷y	
C0CD	R↓ R↓ ↑ ↑ CLx x≷y	
C0D0	CLx R↓ CLx x≷y	
C0D1	R↓ CLx x≷y 1 R↓	
C0DA	R↓ CLx x≷y	
C0DB	CLx x≷y R↓ x≷y	
C0DC	R↓ CLx x≷y ↑ R↓	
C0DD	− CLx x≷y	

XYZT	Keystrokes	
C100	[1] [R↓] [CLx] [R↓] [CLx] [R↓]	[CLx] [↑] [R↑] [1] [x≷y]
C101	[R↓] [CLx] [x≷y] [1] [↑] [R↓] [x≷y]	[CLx] [↑] [1] [R↑] [1] [R↓]
C10A	[x≷y] [1] [R↓] [CLx] [R↓] [R↓]	[0] [R↑] [1] [x≷y]
C10B	[1] [R↓] [CLx] [R↓] [R↓]	[CLx] [↑] [1] [R↑]
C10C	[↑] [−] [×] [x≷y] [1] [x≷y]	[↑] [−] [×] [1] [R↑]
C10D	[R↓] [CLx] [x≷y] [1] [x≷y]	
C110	[1] [R↓] [−] [CLx] [R↓]	[CLx] [×] [1] [↑] [R↑]
C111	[1] [R↓] [−] [CLx] [−]	
C11A	[x≷y] [1] [R↓] [CLx] [−] [R↓]	[1] [R↑] [1] [x≷y]
C11B	[1] [R↓] [CLx] [−] [R↓]	[R↓] [1] [↑] [R↑]
C11C	[1] [R↓] [−] [R↓] [↑] [R↓]	[R↓] [1] [↑] [R↑] [↑] [R↓]
C11D	[R↓] [R↓] [1] [x≷y] [1] [x≷y]	[R↑] [R↑] [x≷y] [1] [↑] [R↑]
C1A0	[1] [R↓] [R↓] [CLx] [R↓]	[1] [R↑] [0] [R↓]
C1A1	[1] [R↓] [R↓] [R↓] [1] [R↓]	[1] [R↑] [1] [R↓]
C1AA	[1] [R↓] [R↓] [CLx] [−]	[↑] [R↑] [1] [x≷y]
C1AB	[1] [R↓] [R↓] [R↓]	[1] [R↑]
C1AC	[1] [R↓] [R↓] [R↓] [↑] [R↓]	[1] [R↑] [↑] [R↓]
C1AD	[x≷y] [R↓] [x≷y] [1] [x≷y]	
C1B0	[CLx] [x≷y] [1] [R↓] [R↓] [R↓]	[CLx] [x≷y] [1] [R↑]
C1B1	[R↓] [x≷y] [1] [↑] [R↓] [x≷y]	[R↓] [1] [x≷y] [1] [R↑]
C1BA	[x≷y] [1] [R↓] [R↓] [R↓]	[x≷y] [1] [R↑]
C1BB	[x≷y] [1] [R↓] [R↓] [CLx] [−]	[R↓] [↑] [↑] [1] [R↑]
C1BC	[R↓] [x≷y] [1] [x≷y] [↑] [R↓]	[x≷y] [1] [R↑] [↑] [R↓]
C1BD	[R↓] [x≷y] [1] [x≷y]	
C1C0	[↑] [−] [R↓] [R↓] [1] [x≷y]	
C1C1	[R↓] [R↓] [↑] [↑] [1] [↑] [R↓] [x≷y]	[1] [R↑] [↑] [↑] [1] [x≷y]
C1CA	[1] [×] [R↓] [R↓] [1] [x≷y]	[1] [R↑] [×] [1] [LSTx]
C1CB	[R↓] [x≷y] [↑] [↑] [1] [x≷y]	
C1CC	[↑] [−] [−] [R↓] [1] [x≷y]	[R↑] [−] [−] [R↓] [1] [R↑]
C1CD	[R↓] [R↓] [↑] [↑] [1] [x≷y]	
C1D0	[CLx] [R↓] [R↓] [1] [x≷y]	
C1D1	[R↓] [R↓] [1] [↑] [R↓] [x≷y]	
C1DA	[R↓] [R↓] [1] [x≷y]	
C1DB	[x≷y] [R↓] [R↓] [1] [x≷y]	
C1DC	[R↓] [R↓] [1] [x≷y] [↑] [R↓]	
C1DD	[−] [R↓] [1] [x≷y]	

XYZT	Keystrokes
CA00	[x≷y] [CLx] [↑] [R↓] [R↓] [x≷y] [−] [CLx] [↑] [LSTx] [R↑]
CA01	[↑] [R↓] [CLx] [R↓] [R↓] [1] [R↓] [0] [x≷y] [R↑] [1] [R↓]
CA0A	[↑] [R↓] [x≷y] [CLx] [R↓] [R↓]
CA0B	[↑] [R↓] [CLx] [R↓] [R↓] [0] [x≷y] [R↑]
CA0C	[0] [−] [R↓] [CLx] [R↓] [R↓] [x≷y] [↑] [−] [x≷y] [R↑]
CA0D	[R↓] [CLx] [R↓] [x≷y] [R↓]
CA10	[x≷y] [1] [R↓] [CLx] [R↓] [x≷y] [1] [x≷y] [R↑] [0] [R↓]
CA11	[x≷y] [1] [R↓] [CLx] [−] [x≷y] [1] [x≷y] [R↑] [1] [R↓]
CA1A	[↑] [R↓] [x≷y] [R↓] [1] [R↓] [R↓] [↑] [R↑] [x≷y] [1] [R↑] [R↑]
CA1B	[x≷y] [1] [R↓] [R↓] [x≷y] [1] [x≷y] [R↑]
CA1C	[x≷y] [1] [R↓] [R↓] [x≷y] [↑] [R↓] [1] [x≷y] [R↑] [↑] [R↓]
CA1D	[R↓] [R↓] [x≷y] [1] [R↓] [R↓]
CAA0	[↑] [R↓] [R↓] [CLx] [R↓] [↑] [R↑] [0] [R↓]
CAA1	[↑] [R↓] [R↓] [R↓] [1] [R↓] [↑] [R↑] [1] [R↓]
CAAA	[↑] [R↓] [R↓] [CLx] [−] [↑] [R↑] [0] [−]
CAAB	[↑] [R↓] [R↓] [R↓] [↑] [R↑]
CAAC	[↑] [R↓] [R↓] [R↓] [↑] [R↓] [↑] [R↑] [↑] [R↓]
CAAD	[R↓] [CLx] [−] [x≷y] [R↓]
CAB0	[R↓] [R↓] [x≷y] [CLx] [R↓] [0] [R↑] [x≷y] [R↓]
CAB1	[R↓] [R↓] [x≷y] [R↓] [1] [R↓] [1] [R↑] [x≷y] [R↓]
CABA	[↑] [R↓] [x≷y] [R↓] [R↓] [↑] [R↑] [x≷y] [R↓]
CABB	[x≷y] [↑] [R↓] [R↓] [x≷y] [0] [R↑] [+]
CABC	[0] [−] [R↓] [R↓] [R↓] [0] [−] [R↑]
CABD	[R↓] [R↓] [x≷y] [R↓]
CAC0	[x≷y] [↑] [−] [R↓] [x≷y]
CAC1	[x≷y] [1] [x≷y] [CLx] [−] [R↓] [x≷y] [1] [R↑] [↑] [R↑] [x≷y]
CACA	[x≷y] [↑] [−] [R↓] [↑] [R↓] [x≷y] [↑] [R↑] [↑] [R↑] [x≷y]
CACB	[x≷y] [0] [−] [R↓] [x≷y]
CACC	[x≷y] [↑] [−] [−] [x≷y]
CACD	[R↓] [R↓] [↑] [R↓] [x≷y] [R↓] [R↑] [R↑] [↑] [R↑] [x≷y]
CAD0	[x≷y] [CLx] [R↓] [x≷y]
CAD1	[x≷y] [R↓] [1] [R↓] [x≷y]
CADA	[x≷y] [R↓] [↑] [R↓] [x≷y]
CADB	[x≷y] [R↓] [x≷y]
CADC	[x≷y] [R↓] [x≷y] [↑] [R↓]
CADD	[x≷y] [CLx] [−] [x≷y]

XYZT	Keystrokes	
CB00	[CLx] [↑] [R↓] [R↓] [x≷y]	
CB01	[1] [x≷y] [CLx] [R↓] [R↓] [x≷y]	[CLx] [x≷y] [1] [R↑] [x≷y] [R↓]
CB0A	[0] [R↓] [R↓] [x≷y]	[x≷y] [0] [x≷y] [R↑]
CB0B	[0] [R↓] [R↓] [↑] [R↓] [x≷y]	[R↓] [↑] [↑] [CLx] [x≷y] [R↑]
CB0C	[↑] [−] [x≷y] [R↓] [R↓] [R↓]	[↑] [−] [x≷y] [R↑]
CB0D	[CLx] [x≷y] [R↓] [R↓] [x≷y] [R↓]	
CB10	[1] [R↓] [CLx] [R↓] [x≷y]	[CLx] [x≷y] [1] [x≷y] [R↑]
CB11	[1] [R↓] [CLx] [−] [x≷y]	
CB1A	[1] [R↓] [R↓] [x≷y]	[x≷y] [1] [x≷y] [R↑]
CB1B	[1] [R↓] [R↓] [↑] [R↓] [x≷y]	[R↓] [↑] [↑] [1] [x≷y] [R↑]
CB1C	[1] [R↓] [R↓] [x≷y] [↑] [R↓]	[x≷y] [1] [x≷y] [R↑] [↑] [R↓]
CB1D	[x≷y] [R↓] [R↓] [x≷y] [1] [R↓] [R↓]	
CBA0	[↑] [R↓] [CLx] [R↓] [x≷y]	
CBA1	[1] [x≷y] [R↓] [R↓] [x≷y]	[x≷y] [1] [R↑] [x≷y] [R↓]
CBAA	[↑] [R↓] [R↓] [x≷y]	
CBAB	[x≷y] [↑] [R↓] [x≷y] [R↓] [R↓]	[x≷y] [↑] [R↑] [x≷y] [R↓]
CBAC	[↑] [R↓] [R↓] [x≷y] [↑] [R↓]	[x≷y] [0] [−] [R↑]
CBAD	**[x≷y] [R↓] [R↓] [x≷y] [R↓]**	
CBB0	[CLx] [x≷y] [↑] [R↓] [R↓] [R↓]	[CLx] [x≷y] [↑] [R↑]
CBB1	[R↓] [x≷y] [1] [↑] [×] [R↓]	[R↓] [1] [x≷y] [↑] [R↑]
CBBA	[x≷y] [↑] [R↓] [R↓] [R↓]	[x≷y] [↑] [R↑]
CBBB	[R↓] [↑] [↑] [R↓] [R↓] [R↓]	[R↓] [↑] [↑] [R↑]
CBBC	[↑] [−] [x≷y] [R↓] [−] [R↓]	[x≷y] [↑] [R↑] [↑] [R↓]
CBBD	[R↓] [↑] [R↓] [R↓] [x≷y] [R↓]	
CBC0	[↑] [−] [R↓] [x≷y]	
CBC1	[↑] [−] [R↓] [1] [R↓] [x≷y]	[x≷y] [1] [R↑] [↑] [R↑] [x≷y]
CBCA	[0] [−] [R↓] [x≷y]	
CBCB	[↑] [−] [R↓] [↑] [R↓] [x≷y]	[x≷y] [↑] [R↑] [↑] [R↑] [x≷y]
CBCC	[↑] [−] [−] [x≷y]	
CBCD	[x≷y] [R↓] [R↓] [↑] [R↓] [x≷y] [R↓]	[CLx] [R↑] [+] [R↓] [x≷y]
CBD0	[CLx] [R↓] [x≷y]	
CBD1	[R↓] [1] [R↓] [x≷y]	
CBDA	**[R↓] [x≷y]**	
CBDB	[R↓] [↑] [R↓] [x≷y]	
CBDC	[R↓] [x≷y] [↑] [R↓]	
CBDD	[CLx] [−] [x≷y]	

XYZT	Keystrokes	
CC00	[↑] [−] [R↓] [CLx] [R↓]	[CLx] [↑] [R↑] [↑]
CC01	[↑] [−] [R↓] [R↓] [1] [R↓]	[1] [x≷y] [CLx] [R↑] [↑]
CC0A	[x≷y] [↑] [−] [R↓] [R↓]	[0] [R↑] [↑]
CC0B	[↑] [−] [R↓] [R↓]	
CC0C	[↑] [−] [×] [R↓] [R↓]	
CC0D	[R↓] [CLx] [x≷y] [↑]	
CC10	[↑] [−] [×] [1] [R↓] [R↓]	[CLx] [↑] [1] [R↑] [↑]
CC11	[1] [R↓] [−] [R↓] [↑]	[R↓] [1] [↑] [R↑] [↑]
CC1A	[1] [R↓] [R↓] [R↓] [↑]	[1] [R↑] [↑]
CC1B	[R↓] [x≷y] [1] [x≷y] [↑]	[x≷y] [1] [R↑] [↑]
CC1C	[R↓] [R↓] [1] [x≷y] [↑] [↑] [R↓]	[1] [R↑] [↑] [↑] [R↓]
CC1D	[R↓] [R↓] [1] [x≷y] [↑]	
CCA0	[0] [−] [R↓] [CLx] [R↓]	[0] [x≷y] [R↑] [↑]
CCA1	[x≷y] [1] [R↓] [R↓] [x≷y] [↑]	[1] [x≷y] [R↑] [↑]
CCAA	[↑] [R↓] [R↓] [R↓] [↑]	[↑] [R↑] [↑]
CCAB	[0] [−] [R↓] [R↓]	
CCAC	[x≷y] [R↓] [x≷y] [↑] [↑] [R↓]	[↑] [R↑] [↑] [↑] [R↓]
CCAD	[x≷y] [R↓] [x≷y] [↑]	
CCB0	[↑] [−] [x≷y] [R↓] [R↓]	
CCB1	[1] [R↓] [R↓] [x≷y] [↑]	[x≷y] [1] [x≷y] [R↑] [↑]
CCBA	[x≷y] [0] [−] [R↓] [R↓]	
CCBB	[↑] [−] [x≷y] [R↓] [−]	[x≷y] [↑] [R↑] [↑]
CCBC	[R↓] [x≷y] [↑] [↑] [R↓]	
CCBD	[R↓] [x≷y] [↑]	
CCC0	[↑] [−] [×] [R↓]	
CCC1	[↑] [−] [−] [R↓] [1] [R↓]	[1] [R↑] [↑] [↑]
CCCA	[x≷y] [↑] [−] [−] [R↓]	[↑] [R↑] [↑] [↑]
CCCB	[↑] [−] [−] [R↓]	
CCCC	[↑] [−] [×] [−]	
CCCD	[R↓] [R↓] [↑] [↑]	
CCD0	[CLx] [R↓] [R↓] [↑]	
CCD1	[R↓] [1] [R↓] [R↓] [↑]	
CCDA	[R↓] [R↓] [↑]	
CCDB	[x≷y] [R↓] [R↓] [↑]	
CCDC	[R↓] [R↓] [↑] [↑] [R↓]	
CCDD	[−] [R↓] [↑]	

XYZT	Keystrokes	
CD00	[CLx] [R↓] [CLx] [R↓]	
CD01	[CLx] [R↓] [R↓] [1] [R↓]	
CD0A	[x≷y] [CLx] [R↓] [R↓]	
CD0B	[CLx] [R↓] [R↓]	
CD0C	[CLx] [R↓] [R↓] [↑] [R↓]	
CD0D	[−] [CLx] [R↓] [x≷y] [R↓]	
CD10	[R↓] [1] [R↓] [CLx] [R↓]	
CD11	[R↓] [1] [R↓] [CLx] [−]	
CD1A	[x≷y] [R↓] [1] [R↓] [R↓]	
CD1B	[R↓] [1] [R↓] [R↓]	
CD1C	[R↓] [1] [R↓] [R↓] [↑] [R↓]	
CD1D	[−] [R↓] [x≷y] [1] [R↓] [R↓]	
CDA0	[R↓] [CLx] [R↓]	
CDA1	[R↓] [R↓] [1] [R↓]	
CDAA	[R↓] [CLx] [−]	
CDAB	[R↓] [R↓]	
CDAC	[R↓] [R↓] [↑] [R↓]	
CDAD	[R↓] [R↓] [x≷y] [↑] [R↓] [x≷y]	
CDB0	[CLx] [x≷y] [R↓] [R↓]	
CDB1	[R↓] [1] [x≷y] [R↓] [R↓]	
CDBA	[x≷y] [R↓] [R↓]	
CDBB	[R↓] [↑] [R↓] [R↓]	
CDBC	[x≷y] [R↓] [R↓] [↑] [R↓]	[CLx] *[R↑]* [+] *[R↑]*
CDBD	[CLx] [−] [R↓] [x≷y] [R↓]	
CDC0	[R↓] [R↓] [↑] [↑] [R↓] [CLx] [R↓]	[R↓] [CLx] [x≷y] [↑] *[R↑]* [x≷y]
CDC1	[R↓] [R↓] [↑] [↑] [R↓] [R↓] [1] [R↓]	*[R↑]* *[R↑]* [1] [x≷y] [↑] *[R↑]* [x≷y]
CDCA	[x≷y] [R↓] [x≷y] [↑] [R↓] [x≷y] [R↓]	[R↓] [R↓] [↑] [R↓] [x≷y] *[R↑]*
CDCB	[R↓] [x≷y] [↑] [R↓] [x≷y] [R↓]	[R↓] [x≷y] [↑] *[R↑]* [x≷y]
CDCC	[R↓] [R↓] [↑] [↑] [R↓] [R↓]	
CDCD	[−] [R↓] [↑] [R↓] [x≷y] [R↓]	[−] [R↓] [↑] *[R↑]* [x≷y]
CDD0	[−] [CLx] [R↓]	
CDD1	[−] [R↓] [1] [R↓]	
CDDA	[x≷y] [CLx] [−] [R↓]	[−] [R↓] *[LSTx]* [R↓]
CDDB	[CLx] [−] [R↓]	
CDDC	[−] [R↓] [↑] [R↓]	
CDDD	[−] [CLx] [−]	

XYZT	Keystrokes	
D000	CLx R↓ CLx x R↓	R↑ 0 ↑ ↑ R↑
D001	CLx R↓ − R↓ 1 R↓	R↑ 1 R↑ CLx ↑ R↑
D00A	x≷y CLx R↓ R↓ CLx x≷y	x≷y CLx R↑ 0 x≷y
D00B	CLx R↓ R↓ CLx x≷y	CLx R↑ 0 x≷y
D00C	CLx R↓ CLx R↓ R↓	CLx x≷y CLx R↑
D00D	− CLx R↓ CLx R↓ R↓	− CLx x≷y CLx R↑
D010	CLx R↓ R↓ 1 R↓ CLx R↓	CLx R↑ 1 x≷y 0 x≷y
D011	R↓ 1 R↓ − CLx x≷y	CLx R↑ 1 ↑ R↑ R↑
D01A	x≷y R↓ 1 R↓ R↓ CLx x≷y	R↑ 1 x≷y 0 x≷y
D01B	R↓ 1 R↓ R↓ CLx x≷y	R↓ 1 R↑ 0 x≷y
D01C	CLx R↓ R↓ 1 R↓ R↓	CLx 1 x≷y CLx R↑
D01D	− CLx R↓ R↓ 1 R↓ R↓	R↑ 1 ↑ ↑ − R↑
D0A0	R↓ CLx R↓ CLx x≷y	
D0A1	R↓ R↓ 1 R↓ CLx x≷y	x≷y CLx R↑ 1 R↓
D0AA	R↓ − CLx x≷y	
D0AB	R↓ R↓ CLx x≷y	R↑ 0 x≷y
D0AC	x≷y CLx R↓ R↓ R↓	x≷y CLx R↑
D0AD	R↓ R↓ CLx x≷y ↑ R↓	x≷y CLx R↑ ↑ R↓
D0B0	CLx R↓ R↓ CLx R↓	CLx R↑ 0 R↓
D0B1	CLx R↓ R↓ R↓ 1 R↓	CLx R↑ 1 R↓
D0BA	x≷y R↓ R↓ CLx x≷y	x≷y R↑ 0 x≷y
D0BB	CLx R↓ R↓ CLx −	CLx R↑ 0 −
D0BC	CLx R↓ R↓ R↓	CLx R↑
D0BD	CLx R↓ R↓ R↓ ↑ R↓	CLx R↑ ↑ R↓
D0C0	CLx R↓ CLx x≷y R↓ R↓	R↓ CLx x≷y 0 R↑
D0C1	CLx R↓ R↓ 1 x≷y R↓ R↓	− CLx R↑ 1 R↓
D0CA	R↓ R↓ x≷y 0 x≷y	
D0CB	CLx R↓ x≷y R↓ R↓	R↓ x≷y 0 R↑
D0CC	CLx R↓ R↓ ↑ R↓ R↓	CLx x≷y CLx R↑ +
D0CD	− CLx R↓ R↓ R↓	− CLx R↑
D0D0	− CLx R↓ CLx x≷y	
D0D1	− R↓ 1 R↓ CLx x≷y	
D0DA	x≷y CLx − R↓ CLx x≷y	R↑ ↑ ↑ CLx x≷y
D0DB	CLx − R↓ CLx x≷y	
D0DC	− CLx x≷y R↓ x≷y	
D0DD	− − CLx x≷y	

XYZT	Keystrokes	
D100	CLx · R↓ · − · R↓ · 1 · x≷y	CLx · x≷y · CLx · R↑ · 1 · x≷y
D101	CLx · R↓ · R↓ · R↓ · 1 · ↑ · R↓ · x≷y	CLx · R↑ · 1 · ↑ · R↓ · x≷y
D10A	R↓ · R↓ · CLx · x≷y · 1 · x≷y	x≷y · CLx · R↑ · 1 · x≷y
D10B	CLx · R↓ · R↓ · R↓ · 1 · x≷y	CLx · R↑ · 1 · x≷y
D10C	R↓ · 1 · R↓ · CLx · R↓ · R↓	CLx · x · 1 · R↑
D10D	− · R↓ · CLx · x≷y · 1 · x≷y	CLx · x · x · 1 · R↑
D110	R↓ · 1 · R↓ · − · CLx · R↓	CLx · R↑ · x≷y · 1 · ↑ · R↑
D111	R↓ · 1 · R↓ · − · CLx · −	R↑ · 1 · ↑ · ↑ · R↑
D11A	R↓ · R↓ · R↓ · 1 · x≷y · 1 · x≷y	R↑ · x≷y · 1 · ↑ · R↑
D11B	R↓ · 1 · R↓ · R↓ · R↓ · 1 · x≷y	R↓ · 1 · R↑ · 1 · x≷y
D11C	R↓ · 1 · R↓ · CLx · − · R↓	R↑ · R↑ · 1 · ↑ · R↑
D11D	R↓ · 1 · R↓ · − · R↓ · ↑ · R↓	R↑ · ↑ · ↑ · 1 · ↑ · R↑
D1A0	R↓ · CLx · R↓ · R↓ · 1 · x≷y	R↑ · 1 · x≷y · 0 · R↓
D1A1	R↓ · R↓ · R↓ · 1 · ↑ · R↓ · x≷y	R↑ · 1 · ↑ · R↓ · x≷y
D1AA	R↓ · − · R↓ · 1 · x≷y	
D1AB	R↓ · R↓ · R↓ · 1 · x≷y	R↑ · 1 · x≷y
D1AC	x≷y · R↓ · 1 · R↓ · R↓ · R↓	x≷y · R↓ · 1 · R↑
D1AD	R↓ · R↓ · R↓ · 1 · x≷y · ↑ · R↓	R↑ · 1 · x≷y · ↑ · R↓
D1B0	R↓ · 1 · R↓ · R↓ · CLx · R↓	CLx · x≷y · R↑ · 1 · x≷y
D1B1	R↓ · 1 · R↓ · R↓ · R↓ · 1 · R↓	R↑ · 1 · R↑ · 1 · R↑
D1BA	x≷y · R↓ · R↓ · R↓ · 1 · x≷y	x≷y · R↑ · 1 · x≷y
D1BB	R↓ · 1 · R↓ · R↓ · CLx · −	R↓ · ↑ · R↑ · 1 · x≷y
D1BC	R↓ · 1 · R↓ · R↓ · R↓	R↓ · 1 · R↑
D1BD	R↓ · 1 · R↓ · R↓ · R↓ · ↑ · R↓	R↑ · ↑ · R↑ · 1 · R↑
D1C0	CLx · R↓ · R↓ · x≷y · 1 · x≷y	R↓ · CLx · x≷y · 1 · R↑
D1C1	R↓ · R↓ · x≷y · 1 · ↑ · R↓ · x≷y	R↑ · R↑ · 1 · x≷y · 1 · R↑
D1CA	R↓ · R↓ · x≷y · 1 · x≷y	
D1CB	R↓ · x≷y · 1 · R↓ · R↓ · R↓	R↓ · x≷y · 1 · R↑
D1CC	R↓ · 1 · R↓ · R↓ · ↑ · R↓ · R↓	R↑ · R↑ · ↑ · ↑ · 1 · R↑
D1CD	− · R↓ · x≷y · 1 · x≷y	− · R↓ · 1 · R↑
D1D0	− · CLx · R↓ · R↓ · 1 · x≷y	CLx · R↑ · ↑ · ↑ · 1 · x≷y
D1D1	− · R↓ · R↓ · 1 · ↑ · R↓ · x≷y	R↑ · − · 1 · LSTx · 1 · LSTx
D1DA	R↓ · R↓ · R↓ · ↑ · ↑ · 1 · x≷y	R↑ · ↑ · ↑ · 1 · x≷y
D1DB	CLx · − · R↓ · R↓ · 1 · x≷y	CLx · R↑ · + · 1 · LSTx
D1DC	− · x≷y · R↓ · R↓ · 1 · x≷y	− · R↓ · x≷y · 1 · R↑
D1DD	− · − · R↓ · 1 · x≷y	

XYZT	Keystrokes	
DA00	R↓ CLx R↓ CLx R↓	
DA01	R↓ CLx R↓ R↓ 1 R↓	
DA0A	R↓ − CLx R↓ x≷y R↓	
DA0B	R↓ x≷y CLx R↓ R↓	
DA0C	R↓ CLx R↓ R↓	
DA0D	R↓ CLx R↓ R↓ ↑ R↓	*R↑* ↑ ↑ CLx *R↑* *R↑*
DA10	R↓ R↓ 1 R↓ CLx R↓	
DA11	R↓ R↓ 1 R↓ CLx −	*R↑* 1 ↑ *R↑* *R↑*
DA1A	R↓ − R↓ x≷y 1 R↓ R↓	− *R↑* *LSTx* 1 *LSTx* *R↑*
DA1B	R↓ x≷y R↓ 1 R↓ R↓	
DA1C	R↓ R↓ 1 R↓ R↓	
DA1D	R↓ R↓ 1 R↓ R↓ ↑ R↓	*R↑* ↑ ↑ 1 *R↑* *R↑*
DAA0	R↓ − CLx R↓	
DAA1	R↓ − R↓ 1 R↓	
DAAA	R↓ − CLx −	
DAAB	R↓ x≷y CLx − R↓	R↓ − R↓ *LSTx* R↓
DAAC	R↓ CLx − R↓	x≷y R↓ ↑ *R↑*
DAAD	R↓ − R↓ ↑ R↓	
DAB0	R↓ R↓ CLx R↓	*R↑* 0 R↓
DAB1	R↓ R↓ R↓ 1 R↓	*R↑* 1 R↓
DABA	R↓ R↓ R↓ x≷y ↑ R↓ x≷y	*R↑* x≷y ↑ R↓ x≷y
DABB	R↓ R↓ CLx −	*R↑* 0 −
DABC	**R↓ R↓ R↓**	*R↑*
DABD	R↓ R↓ R↓ ↑ R↓	*R↑* ↑ R↓
DAC0	R↓ CLx x≷y R↓ R↓	
DAC1	R↓ R↓ 1 x≷y R↓ R↓	
DACA	R↓ CLx − R↓ x≷y R↓	x≷y R↓ ↑ *R↑* x≷y R↓
DACB	**R↓ x≷y R↓ R↓**	
DACC	R↓ R↓ ↑ R↓ R↓	x≷y CLx *R↑* +
DACD	R↓ x≷y R↓ R↓ ↑ R↓	x≷y CLx − *R↑*
DAD0	x≷y R↓ x≷y ↑ − R↓ x≷y	*R↑* ↑ ↑ R↓ CLx R↓
DAD1	x≷y CLx − x≷y R↓ 1 R↓ x≷y	*R↑* 1 x≷y ↑ *R↑* x≷y
DADA	R↓ − R↓ ↑ R↓ x≷y R↓	R↓ − R↓ ↑ *R↑* x≷y
DADB	x≷y R↓ R↓ R↓ ↑ R↓ x≷y R↓	x≷y *R↑* ↑ *R↑* x≷y
DADC	x≷y CLx − x≷y R↓ x≷y	− R↓ x≷y *LSTx* *R↑*
DADD	R↓ R↓ R↓ ↑ ↑ R↓ R↓	*R↑* ↑ ↑ *R↑* *R↑*

XYZT	Keystrokes	
DB00	[CLx] [x≷y] [R↓] [R↓] [CLx] [R↓]	[CLx] [x≷y] (R↑) [0] [R↓]
DB01	[CLx] [x≷y] [R↓] [R↓] [R↓] [1] [R↓]	[CLx] [x≷y] (R↑) [1] [R↓]
DB0A	[R↓] [R↓] [CLx] [R↓] [x≷y] [R↓]	(R↑) [x≷y] [0] (R↑) (R↑)
DB0B	[R↓] [↑] [R↓] [x≷y] [CLx] [R↓] [R↓]	[CLx] (R↑) [0] [−] (R↑) [x≷y]
DB0C	[CLx] [x≷y] [R↓] [R↓] [R↓]	[CLx] [x≷y] (R↑)
DB0D	[CLx] [−] [R↓] [CLx] [R↓] [R↓]	[CLx] [x≷y] (R↑) [↑] [R↓]
DB10	[R↓] [1] [x≷y] [R↓] [R↓] [CLx] [R↓]	[CLx] (R↑) [x≷y] [1] (R↑) (R↑)
DB11	[CLx] [R↓] [R↓] [R↓] [1] [R↓] [+]	[CLx] (R↑) [1] [R↓] [+]
DB1A	[R↓] [R↓] [R↓] [x≷y] [1] [R↓] [R↓]	(R↑) [x≷y] [1] (R↑) (R↑)
DB1B	[R↓] [↑] [R↓] [x≷y] [R↓] [1] [R↓] [R↓]	[R↓] [↑] (R↑) [x≷y] [1] [R↓] [R↓]
DB1C	[R↓] [1] [x≷y] [R↓] [R↓] [R↓]	[R↓] [1] [x≷y] (R↑)
DB1D	[CLx] [−] [R↓] [R↓] [1] [R↓] [R↓]	(R↑) [↑] (R↑) [1] [x≷y] (R↑)
DBA0	[x≷y] [R↓] [R↓] [CLx] [R↓]	[x≷y] (R↑) [0] [R↓]
DBA1	[x≷y] [R↓] [R↓] [R↓] [1] [R↓]	[x≷y] (R↑) [1] [R↓]
DBAA	[x≷y] [R↓] [R↓] [CLx] [−]	[x≷y] (R↑) [0] [−]
DBAB	[R↓] [x≷y] [R↓] [↑] [R↓] [x≷y]	(R↑) [0] [−] (R↑) [x≷y]
DBAC	[x≷y] [R↓] [R↓] [R↓]	[x≷y] (R↑)
DBAD	[x≷y] [R↓] [R↓] [R↓] [↑] [R↓]	[x≷y] (R↑) [↑] [R↓]
DBB0	[CLx] [x≷y] [R↓] [×] [R↓]	(R↑) [0] (R↑) [↑] (R↑)
DBB1	[x≷y] [R↓] [−] [R↓] [1] [R↓]	(R↑) [1] (R↑) [↑] (R↑)
DBBA	[R↓] [R↓] [CLx] [−] [x≷y] [R↓]	(R↑) [x≷y] [0] [−] [R↓]
DBBB	[x≷y] [R↓] [−] [CLx] [−]	(R↑) [x≷y] [↑] [−] [−]
DBBC	[R↓] [↑] [R↓] [R↓] [R↓]	[R↓] [↑] (R↑)
DBBD	[x≷y] [R↓] [−] [R↓] [↑] [R↓]	(R↑) [↑] (R↑) [↑] (R↑)
DBC0	[R↓] [R↓] [R↓] [x≷y] [CLx] [R↓]	[CLx] (R↑) [x≷y] [R↓]
DBC1	[R↓] [1] [R↓] [R↓] [R↓] [x≷y] [R↓]	[R↓] [1] (R↑) [x≷y] [R↓]
DBCA	[R↓] [R↓] [R↓] [x≷y] [R↓]	(R↑) [x≷y] [R↓]
DBCB	[R↓] [↑] [R↓] [x≷y] [R↓] [R↓]	[R↓] [↑] (R↑) [x≷y] [R↓]
DBCC	[CLx] [R↓] [R↓] [R↓] [+]	[CLx] (R↑) [+]
DBCD	[CLx] [−] [R↓] [R↓] [R↓]	[CLx] [−] (R↑)
DBD0	[CLx] [−] [x≷y] [CLx] [R↓] [x≷y]	[CLx] (R↑) [↑] (R↑) [x≷y]
DBD1	[CLx] [−] [x≷y] [R↓] [x≷y] [1] [R↓]	[R↓] [1] (R↑) [↑] (R↑) [x≷y]
DBDA	[R↓] [R↓] [R↓] [↑] [R↓] [x≷y] [R↓]	(R↑) [↑] (R↑) [x≷y]
DBDB	[CLx] [−] [x≷y] [R↓] [↑] [R↓] [x≷y]	[R↓] [↑] (R↑) [↑] (R↑) [x≷y]
DBDC	[CLx] [−] [x≷y] [R↓] [x≷y]	
DBDD	[R↓] [x≷y] [↑] [−] [−] [x≷y]	[CLx] (R↑) [↑] [R↓] [+]

XYZT	Keystrokes	
DC00	CLx R↓ CLx R↓ x≷y	
DC01	CLx R↓ R↓ 1 R↓ x≷y	
DC0A	x≷y CLx R↓ R↓ x≷y	
DC0B	CLx R↓ R↓ x≷y	
DC0C	CLx R↓ R↓ ↑ R↓ x≷y	
DC0D	CLx R↓ R↓ x≷y ↑ R↓	− CLx x≷y R↑
DC10	R↓ 1 R↓ CLx R↓ x≷y	
DC11	R↓ 1 R↓ CLx − x≷y	
DC1A	x≷y R↓ 1 R↓ R↓ x≷y	
DC1B	R↓ 1 R↓ R↓ x≷y	
DC1C	R↓ 1 R↓ R↓ ↑ R↓ x≷y	R↑ R↑ ↑ ↑ 1 x≷y R↑
DC1D	R↓ 1 R↓ R↓ x≷y ↑ R↓	− R↓ 1 x≷y R↑
DCA0	R↓ CLx R↓ x≷y	
DCA1	R↓ R↓ x≷y 1 R↓	
DCAA	R↓ CLx − x≷y	
DCAB	R↓ R↓ x≷y	
DCAC	R↓ R↓ ↑ R↓ x≷y	
DCAD	R↓ R↓ x≷y ↑ R↓	
DCB0	CLx x≷y R↓ R↓ x≷y	
DCB1	x≷y R↓ R↓ 1 R↓ x≷y	
DCBA	x≷y R↓ R↓ x≷y	
DCBB	R↓ ↑ R↓ R↓ x≷y	
DCBC	x≷y R↓ R↓ ↑ R↓ x≷y	CLx R↑ + R↑ x≷y
DCBD	x≷y R↓ R↓ x≷y ↑ R↓	CLx − x≷y R↑
DCC0	CLx × x≷y R↓ × R↓	R↓ CLx x≷y ↑ R↑
DCC1	R↓ R↓ x≷y 1 ↑ × R↓	R↑ R↑ 1 x≷y ↑ R↑
DCCA	R↓ R↓ ↑ R↓ R↓ x≷y R↓	R↑ x≷y R↑ ↑ R↑
DCCB	R↓ x≷y ↑ R↓ R↓ R↓	R↓ x≷y ↑ R↑
DCCC	− x≷y R↓ − CLx −	R↑ R↑ ↑ ↑ R↑
DCCD	− R↓ ↑ R↓ R↓ R↓	− R↓ ↑ R↑
DCD0	− CLx R↓ x≷y	
DCD1	− R↓ 1 R↓ x≷y	
DCDA	x≷y CLx − R↓ x≷y	
DCDB	CLx − R↓ x≷y	
DCDC	− R↓ ↑ R↓ x≷y	
DCDD	− CLx − x≷y	

XYZT	Keystrokes	
DD00	[−] [CLx] [R↓] [CLx] [R↓]	
DD01	[−] [CLx] [R↓] [R↓] [1] [R↓]	[CLx] [R↑] [↑] [↑] [1] [R↓]
DD0A	[R↓] [R↓] [CLx] [x≷y] [↑]	[x≷y] [CLx] [R↑] [↑]
DD0B	[CLx] [R↓] [R↓] [R↓] [↑]	[CLx] [R↑] [↑]
DD0C	[−] [CLx] [R↓] [R↓]	
DD0D	[−] [−] [CLx] [R↓] [R↓]	[CLx] [R↑] [↑] [↑] [R↓]
DD10	[CLx] [x] [x] [1] [R↓] [R↓]	[CLx] [R↑] [1] [x≷y] [↑]
DD11	[−] [R↓] [1] [R↓] [CLx] [−]	[R↑] [−] [1] [↑] [LSTx] [LSTx]
DD1A	[R↓] [R↓] [R↓] [1] [x≷y] [↑]	[R↑] [1] [x≷y] [↑]
DD1B	[R↓] [1] [R↓] [R↓] [R↓] [↑]	[R↓] [1] [R↑] [↑]
DD1C	[−] [R↓] [1] [R↓] [R↓]	
DD1D	[−] [−] [R↓] [1] [R↓] [R↓]	[R↓] [1] [R↑] [↑] [↑] [R↓]
DDA0	[R↓] [CLx] [R↓] [R↓] [↑]	[R↑] [↑] [↑] [CLx] [R↓]
DDA1	[R↓] [R↓] [1] [R↓] [R↓] [↑]	[R↑] [↑] [↑] [1] [R↓]
DDAA	[R↓] [−] [R↓] [↑]	
DDAB	[R↓] [R↓] [R↓] [↑]	[R↑] [↑]
DDAC	[x≷y] [CLx] [−] [R↓] [R↓]	[−] [R↓] [LSTx] [R↓] [R↓]
DDAD	[R↓] [R↓] [R↓] [↑] [↑] [R↓]	[R↑] [↑] [↑] [R↓]
DDB0	[CLx] [−] [R↓] [CLx] [R↓]	[CLx] [x≷y] [R↑] [↑]
DDB1	[CLx] [−] [R↓] [R↓] [1] [R↓]	[R↓] [1] [x≷y] [R↑] [↑]
DDBA	[x≷y] [R↓] [R↓] [R↓] [↑]	[x≷y] [R↑] [↑]
DDBB	[CLx] [−] [R↓] [CLx] [−]	[R↓] [↑] [R↑] [↑]
DDBC	[CLx] [−] [R↓] [R↓]	
DDBD	[CLx] [−] [R↓] [R↓] [↑] [R↓]	[x≷y] [R↑] [↑] [↑] [R↓]
DDC0	[−] [CLx] [x≷y] [R↓] [R↓]	
DDC1	[−] [x≷y] [R↓] [R↓] [1] [R↓]	
DDCA	[R↓] [R↓] [x≷y] [↑]	
DDCB	[CLx] [−] [x≷y] [R↓] [R↓]	
DDCC	[−] [R↓] [↑] [R↓] [R↓]	
DDCD	[−] [R↓] [x≷y] [↑]	
DDD0	[−] [−] [CLx] [R↓]	
DDD1	[−] [−] [R↓] [1] [R↓]	
DDDA	[R↓] [R↓] [R↓] [↑] [↑]	[R↑] [↑] [↑]
DDDB	[CLx] [−] [R↓] [R↓] [↑]	[x≷y] [R↑] [↑] [↑]
DDDC	[−] [CLx] [−] [R↓]	
DDDD	[−] [−] [CLx] [−]	

0.0 Cases without 1.

0.1 Left column compared with Table 2.5.1 (*compared in detail in sec. 2.0*)

0.1.1 10 Shorter cases
0B00 0BBB 0C0C 0CCC B000 B0BB C0CC CC0C CCC0 CCCC

0.1.2 41 cases with improved beginning/ending
00AA 00BB 00CA 0A00 0AA0 0BB0 0BCA 0C00 0CA0 0CAA 0CAC 0CDD
0D00 0DAA 0DBB 0DDD A000 A00A AA0A AACC ACAC ACBC ACCA ACCB
B00A B0B0 B0CA BA0C BACC BCA0 C000 C0BB CA00 CA0B CAAC CACA
CACB CBA0 CBAC CCAA CCBA

0.1.3 35 faster cases
0AAC 0C0B 0DAD 0DCC A0A0 A0AA A0AC A0B0 A0C0 A0CB ABDA ACB0
AD0A ADCA ADCD B0A0 B0BD B0C0 B0DC BADA BADB BDBB BDBD BDC0
C0B0 CCAC CCBC CDAD DABA DACD DBBD DC0D DCBD DCC0 DCCC

0.1.4 9 cases with less key usage
000D 00C0 0BBD A0DD B0AA B0DD BCB0 CDC0 D0BB

0.1.5 27 cases with miscellaneous differences
000C 00D0 00DA 00DB 0DBC AADB ABAD AD00 AD0C ADB0 ADBA ADBC
ADCC B0AD BAAD BC0D BCAD BD0D BDCD D000 DB0A DBAA DBB0 DBC0
DBCA DBD0 DCCA

0.1.6 4 cases that are equivalent, but with interesting differences
BA0D BAD0 BADC BADD

0.2 Right column compared with left column

0.2.1 265 shorter cases
000D 00AD 00C0 00CA 00D0 00DA 00DB 0A0D 0ABD 0ADB 0ADC 0B0D
0BAD 0BBD 0C0A 0C0B 0CA0 0CAA 0CAB 0CAC 0CBA 0CBB 0CBC 0D0A
0D0B 0D0C 0DAB 0DAD 0DB0 0DBA 0DBC 0DBD 0DDA A000 A00A A00C
A00D A0A0 A0AC A0AD A0BD A0C0 A0CA A0D0 A0DA A0DB A0DC A0DD
AAAD AABD AACA AACB AAD0 AADB AADC AADD AB0C AB0D ABAB ABAC
ABAD ABBC ABBD ABD0 ABDA ABDB ABDD AC0A AC0D ACAB ACAC ACAD
ACBA ACBC ACBD ACCA ACCD AD00 AD0A AD0B AD0C AD0D ADB0 ADBA
ADBB ADBC ADBD ADC0 ADCA ADCC ADCD ADD0 ADDA ADDB ADDD B000
B00A B00B B00D B0A0 B0AA B0AB B0AD B0BD B0D0 B0DA B0DB BA0A
BA0B BA0C BA0D BAA0 BAAA BAAB BAAD BABC BABD BAD0 BADA BADB
BADD BB00 BB0D BBAA BBAD BBDB BBDC BBDD BC0D BCAB BCAD BCB0
BCBA BCBC BCBD BCCD BD0A BD0B BD0D BDAB BDAD BDBA BDBC BDBD
BDC0 BDCA BDCB BDCC BDCD BDD0 BDDA BDDB C00A C00B C00C C0A0
C0AA C0AB C0AC C0B0 C0BA C0BB C0BC CA00 CA0B CA0C CAA0 CAAA
CAAB CAAC CAB0 CABA CABB CABC CACA CACD CB0C CBAB CBAC CBB0
CBBA CBBB CBBC CBCD CC00 CC0A CCA0 CCAA CCAC CCBB CCCA CDBC
CDC0 CDCA CDCB CDCD D00A D00B D00C D00D D0AB D0AC D0AD D0B0
D0BA D0BB D0BC D0BD D0C0 D0CB D0CC D0CD D0DA DAB0 DABA DABB
DABC DABD DACC DACD DAD0 DADA DADB DADC DADD DB00 DB0A DB0B
DB0C DB0D DBA0 DBAA DBAB DBAC DBAD DBBA DBBC DBBD DBC0 DBCA
DBCB DBCC DBCD DBD0 DBDA DBDB DBDD DC0D DCBC DCBD DCC0 DCCA
DCCB DCCC DCCD DD0A DD0B DDAB DDAD DDB0 DDBA DDBB DDBD DDDA
DDDB

0.2.2 29 cases with better beginning/ending
000C 00CD 00DC 00DD 0AAC 0AD0 0ADA 0B0B 0BAB 0BBC 0C0C 0C0D
0CCD 0D0D 0DA0 0DC0 0DCB 0DCD A00B AA00 AA0A AAC0 AACC AADA
BC0B BCAC CB0A CB0B DDA0

0.2.3 16 faster cases
AB0B ABBA ABBB ACAA ADAB ADAC ADDC BABA BCCB BDBB BDDD C000
CBCB DAAC DACA DD0D

0.2.4 6 cases with less key usage
BBBD BDAA CDDA DAAB DBB0 DDAC

0.2.5 7 cases with miscellaneous differences
0ADD AC0C ACDC ADAD D000 DA0D DBBB

1.0 Cases with 1
1.1 — (Table 2.5.1 does not include 1s)
1.2 Right column compared with left column

1.2.1 311 shorter cases
0010 001D 00C1 00D1 0100 010B 010C 010D 0110 011C 011D 01AD
01C0 01C1 01CA 01D0 01D1 01DA 01DB 0A1D 0AD1 0B01 0B11 0B1D
0C01 0C1A 0C1B 0C1C 0CA1 0D10 0D1A 0D1B 0D1C 0DB1 100C 100D
1010 10AD 10CA 10DB 10DC 111D 11AD 11C0 11C1 11CA 11D0 11D1
11DA 11DB 1A0D 1A1D 1AAD 1ABD 1ACA 1AD0 1AD1 1ADB 1ADC 1ADD
1B00 1B0D 1B11 1B1D 1BAB 1BAD 1BB1 1BCB 1BD1 1BDB 1BDD 1C00
1C01 1C0A 1C0B 1C10 1C1A 1C1B 1C1C 1CA0 1CA1 1CAA 1CAB 1CAC
1CBA 1CBB 1CC1 1CDC 1D01 1D0A 1D0B 1D0C 1D10 1D1A 1D1B 1D1C
1DA1 1DAB 1DAD 1DB0 1DB1 1DBA 1DBB 1DBC 1DBD 1DCC 1DDA A001
A011 A01A A01C A01D A0A1 A0C1 A0D1 A100 A10A A10D A110 A111
A11A A11C A11D A1A0 A1A1 A1AC A1AD A1BD A1C0 A1C1 A1CA A1D0
A1D1 A1DA A1DB A1DC A1DD AA1D AAD1 AB1C AB1D ABA1 ABD1 AC01
AC1A AC1C AC1D ACA1 ACC1 AD01 AD10 AD11 AD1A AD1B AD1C AD1D
ADB1 ADC1 ADD1 B001 B010 B011 B01A B01B B01D B0A1 B0D1 B100
B10A B10D B110 B111 B11A B11B B11D B1A0 B1A1 B1AA B1AB B1AD
B1B1 B1BD B1D0 B1D1 B1DA B1DB B1DD BA01 BA10 BA1A BA1B BA1D
BAA1 BAD1 BB01 BB11 BB1D BBD1 BC1D BCB1 BD10 BD1A BD1B BD1D
BDB1 BDD1 C001 C010 C01A C01B C01C C0A1 C0B1 C100 C101 C10A
C10B C10C C11A C11B C1A0 C1A1 C1AA C1AB C1AC C1B0 C1B1 C1BA
C1BB C1BC C1C1 C1CA CA01 CA10 CA11 CA1A CA1B CA1C CAA1 CAB1
CAC1 CBB1 CC01 CC10 CC1A CC1B CC1C CCA1 CCC1 CDC1 D010 D01A
D01B D01C D01D D0A1 D0B1 D0C1 D101 D10A D10B D10C D10D D111
D11A D11B D11C D11D D1A0 D1A1 D1AB D1AC D1AD D1B0 D1B1 D1BA
D1BB D1BC D1BD D1C0 D1C1 D1CB D1CC D1CD D1D1 D1DA D1DB D1DC
DA11 DA1A DA1D DAB1 DAD1 DB01 DB10 DB11 DB1A DB1B DB1C DB1D
DBA1 DBB1 DBC1 DBD1 DC1D DCC1 DD10 DD1A DD1B DDA1 DDB1

1.2.2 56 cases with improved beginning/ending
001C 0101 010A 011B 01CB 01DC 0A10 0A11 0AA1 0AB1 0C10 0CB1
0DC1 1011 101D 10BD 10C0 11DD 1A00 1A10 1A11 1AA0 1AAC 1BBD
1BD0 1BDA 1C11 1CB0 1CCA 1D00 1D11 1DA0 1DAA 1DCB A010 A101
A10B A11B AA10 AA11 AA1A AA1C AB10 AB1B B0B1 BA1C C110 C11C
CB01 CB10 CB1A CB1B CB1C CBA1 CC11 CCB1

1.2.3 22 faster cases
01DD 0D1D 10D1 110D 1D1D 1DD0 1DD1 1DDB A1CC B11C BC1C BCC1
C11D CBC1 D001 D011 D100 D110 D1D0 DD01 DD11 DD1D

1.2.4 7 cases with less key usage
0A1C 11BD 1A1C A1CD AB01 BD11 C1CC

1.2.5 2 cases with miscellaneous differences
B1DC DC1C

Code	Left	Right
0000	CLx ↑ ↑ ↑	
000A	0 ↑ ↑	
000B	CLx ↑ ↑	
000C	CLx x≷y CLx ↑	R↓ CLx ↑ ↑
000D	R↓ CLx x≷y CLx ↑	R↓ R↓ CLx ↑ ↑
00A0	0 ↑ ↑ R↓	
00AA	0 ↑ ↑ −	↑ ↑ CLx ↑
00AB	0 ↑	
00AC	x≷y CLx ↑	
00AD	x≷y R↓ x≷y CLx ↑	
00B0	CLx ↑ ↑ R↓	
00BA	x≷y 0 ↑	
00BB	0 x≷y ↑ −	CLx ↑ ↑ −
00BC	CLx ↑	
00BD	R↓ x≷y CLx ↑	
00C0	CLx x≷y CLx ↑ R↓	R↓ CLx ↑ ↑ R↓
00CA	0 x≷y R↓ x≷y CLx	↑ R↓ R↓ CLx ↑
00CB	R↓ x≷y 0 ↑	
00CC	CLx x≷y ↑ −	
00CD	CLx x≷y CLx	
00D0	CLx R↓ CLx x≷y CLx	CLx R↓ R↓ CLx ↑
00DA	R↓ CLx x≷y CLx	R↓ R↓ CLx ↑
00DB	CLx x≷y R↓ x≷y CLx	x≷y R↓ R↓ CLx ↑
00DC	R↓ R↓ x≷y 0 ↑	
00DD	− CLx x≷y CLx	

Code	Left	Right
0A00	0 ↑ ↑ R↓ R↓	R↓ CLx R↓ CLx x
0A0A	↑ ↑ CLx x≷y 0	
0A0B	0 x≷y 0	
0A0C	x≷y CLx x≷y 0	
0A0D	R↓ CLx R↓ CLx x≷y R↓	
0AA0	0 ↑ ↑ − R↓	↑ ↑ CLx ↑ R↓
0AAA	↑ ↑ ↑ −	
0AAB	↑ ↑ CLx	
0AAC	R↓ CLx − R↓ CLx	x≷y R↓ ↑ ↑ CLx
0AAD	R↓ − CLx x≷y R↓	
0AB0	0 ↑ R↓	
0ABA	↑ ↑ R↓ CLx	
0ABB	↑ ↑ −	
0ABC	0	
0ABD	R↓ R↓ CLx x≷y R↓	
0AC0	x≷y CLx ↑ R↓	
0ACA	↑ R↓ x≷y CLx	
0ACB	x≷y 0 x≷y R↓	
0ACC	x≷y ↑ −	
0ACD	x≷y CLx	
0AD0	x≷y CLx R↓ x≷y CLx	
0ADA	R↓ − R↓ x≷y 0	
0ADB	x≷y R↓ x≷y CLx	
0ADC	x≷y R↓ x≷y 0 x≷y R↓	
0ADD	x≷y R↓ x≷y ↑ −	

Table 2.5.1

Addr	Sequence		Sequence (right)
0B00	CLx ↑ ↑ R↓ R↓		0 ↑ R↓ x
0B0A	x≷y 0 x≷y 0		
0B0B	CLx x≷y ↑ ↑ R↓ CLx		
0B0C	CLx x≷y 0		
0B0D	R↓ x≷y CLx x≷y 0		
0BA0	x≷y 0 ↑ R↓		
0BAA	↑ ↑ R↓ −		
0BAB	x≷y ↑ ↑ R↓ CLx		
0BAC	x≷y 0		
0BAD	x≷y R↓ R↓ CLx x≷y R↓		
0BB0	0 x≷y ↑ − R↓		CLx ↑ ↑ − R↓
0BBA	x≷y ↑ ↑ CLx		
0BBB	↑ ↑ CLx − −		↑ ↑ − x
0BBC	R↓ ↑ ↑ CLx		
0BBD	x≷y R↓ − CLx x≷y R↓		CLx R↓ R↓ CLx − R↓
0BC0	CLx ↑ R↓		
0BCA	0 x≷y R↓		↑ R↓ CLx
0BCB	CLx x≷y ↑ R↓ x≷y		
0BCC	↑ −		
0BCD	CLx		
0BD0	CLx R↓ x≷y CLx		
0BDA	R↓ x≷y CLx		
0BDB	R↓ ↑ R↓ x≷y CLx		
0BDC	R↓ x≷y 0 x≷y R↓		
0BDD	R↓ x≷y ↑ −		

Addr	Sequence		Sequence (right)
0C00	0 R↓ − CLx		CLx ↑ R↓ x
0C0A	0 R↓ R↓ CLx		
0C0B	CLx x≷y 0 R↓ R↓		CLx ↑ R↓ x≷y R↓
0C0C	↑ − R↓ CLx x≷y R↓		↑ − x x≷y 0
0C0D	R↓ CLx x≷y 0		
0CA0	0 x≷y R↓ R↓ CLx		↑ R↓ CLx R↓ CLx
0CAA	↑ R↓ R↓ CLx		↑ R↓ CLx x
0CAB	R↓ R↓ x≷y CLx		
0CAC	0 − R↓ CLx x≷y R↓		R↓ R↓ ↑ R↓ x≷y CLx
0CAD	x≷y R↓ x≷y 0		
0CB0	R↓ x≷y 0 ↑ R↓		
0CBA	x≷y R↓ R↓ x≷y CLx		
0CBB	CLx x≷y ↑ R↓ R↓		
0CBC	↑ − R↓ x≷y 0		
0CBD	R↓ x≷y 0		
0CC0	↑ − R↓ CLx		
0CCA	0 − R↓ CLx		
0CCB	↑ − x≷y R↓		
0CCC	↑ − − CLx		↑ − x
0CCD	R↓ R↓ ↑ ↑ CLx		
0CD0	CLx R↓ CLx		
0CDA	R↓ CLx		
0CDB	CLx x≷y R↓		
0CDC	R↓ CLx x≷y ↑ R↓ x≷y		
0CDD	− CLx		CLx x

Table 2.5.1

0D00	CLx R↓ − CLx	CLx R↓ CLx x
0D0A	x≷y CLx R↓ R↓ CLx	
0D0B	CLx R↓ R↓ CLx	
0D0C	CLx R↓ CLx x≷y R↓	
0D0D	− R↓ CLx x≷y 0	
0DA0	R↓ CLx R↓ CLx	
0DAA	R↓ − CLx	R↓ CLx x
0DAB	R↓ R↓ CLx	
0DAC	R↓ CLx x≷y R↓	
0DAD	x≷y CLx − R↓ CLx x≷y R↓	R↓ R↓ CLx x≷y ↑ R↓ x≷y
0DB0	CLx x≷y R↓ R↓ CLx	
0DBA	x≷y R↓ R↓ CLx	
0DBB	x≷y R↓ − CLx	x≷y R↓ CLx x
0DBC	CLx x≷y R↓ x≷y R↓	CLx R↓ R↓ R↓ x≷y
0DBD	CLx − R↓ CLx x≷y R↓	
0DC0	CLx R↓ R↓ x≷y 0	
0DCA	R↓ R↓ x≷y 0	
0DCB	x≷y R↓ R↓ x≷y 0	
0DCC	− CLx − R↓ −	x x≷y R↓ CLx x
0DCD	− R↓ x≷y 0	
0DD0	− CLx R↓ CLx	
0DDA	x≷y CLx − R↓ CLx	
0DDB	CLx − R↓ CLx	
0DDC	− CLx x≷y R↓	
0DDD	− − CLx	CLx x x

A000	0 ↑ ↑ R↓ R↓ R↓	R↓ CLx R↓ CLx x R↓
A00A	0 x≷y 0 x≷y ↑ R↓	↑ ↑ CLx x≷y 0 x≷y
A00B	0 x≷y 0 x≷y	
A00C	x≷y CLx x≷y 0 x≷y	
A00D	R↓ CLx R↓ CLx R↓ R↓	
A0A0	↑ ↑ CLx x≷y 0 R↓	↑ ↑ CLx ↑ R↓ x≷y
A0AA	↑ ↑ ↑ − x≷y	↑ ↑ ↑ CLx x≷y
A0AB	↑ ↑ CLx x≷y	
A0AC	R↓ CLx − R↓ CLx x≷y	x≷y R↓ ↑ ↑ CLx x≷y
A0AD	R↓ − CLx x≷y R↓ x≷y	
A0B0	0 x≷y 0 R↓	0 ↑ R↓ x≷y
A0BA	0 x≷y ↑ R↓	
A0BB	↑ ↑ − x≷y	
A0BC	0 x≷y	
A0BD	R↓ x≷y CLx R↓ R↓ R↓	
A0C0	x≷y CLx x≷y 0 R↓	x≷y CLx ↑ R↓ x≷y
A0CA	x≷y CLx x≷y ↑ R↓	
A0CB	x≷y 0 x≷y R↓ x≷y	x≷y ↑ R↓ CLx x≷y
A0CC	x≷y ↑ − x≷y	
A0CD	x≷y CLx x≷y	
A0D0	x≷y CLx R↓ x≷y CLx x≷y	
A0DA	R↓ − CLx R↓ R↓ R↓	
A0DB	x≷y R↓ x≷y CLx x≷y	
A0DC	R↓ CLx R↓ x≷y R↓ R↓	
A0DD	x≷y R↓ x≷y ↑ − x≷y	x≷y CLx − x≷y CLx x≷y

Table 2.5.1

AA00	[0] [x≷y] [0] [x≷y] [↑]
AA0A	[0] [x≷y] [↑] [↑] [R↓] [↑] [↑] [CLx] [x≷y] [↑]
AA0B	[0] [x≷y] [↑]
AA0C	[x≷y] [CLx] [x≷y] [↑]
AA0D	[R↓] [−] [CLx] [R↓] [R↓]
AAA0	[0] [x≷y] [↑] [↑]
AAAA	[↑] [↑] [↑]
AAAB	[↑] [↑]
AAAC	[x≷y] [R↓] [↑] [↑]
AAAD	[R↓] [−] [CLx] [−] [R↓]
AAB0	[↑] [↑] [CLx] [R↓]
AABA	[↑] [↑] [R↓]
AABB	[↑] [↑] [CLx] [−]
AABC	[↑]
AABD	[R↓] [x≷y] [CLx] [−] [R↓] [R↓]
AAC0	[x≷y] [0] [R↓] [R↓] [↑]
AACA	[x≷y] [R↓] [↑] [↑] [R↓]
AACB	[x≷y] [↑] [R↓] [R↓] [↑]
AACC	[0] [−] [x≷y] [R↓] [↑] [x≷y] [↑] [−] [R↓] [↑]
AACD	[x≷y] [R↓] [↑]
AAD0	[R↓] [−] [CLx] [x≷y] [R↓] [R↓]
AADA	[R↓] [−] [R↓] [x≷y] [↑]
AADB	[x≷y] [R↓] [x≷y] [R↓] [↑] [R↓] [R↓] [R↓] [x≷y] [↑]
AADC	[R↓] [CLx] [−] [x≷y] [R↓] [R↓]
AADD	[R↓] [−] [R↓] [↑] [R↓] [R↓]

AB00	[0] [↑] [R↓] [R↓]
AB0A	[↑] [↑] [CLx] [R↓] [R↓]
AB0B	[↑] [↑] [−] [R↓] [x≷y] [R↓]
AB0C	[R↓] [R↓] [x≷y] [CLx] [R↓] [R↓]
AB0D	[R↓] [R↓] [CLx] [R↓] [R↓]
ABA0	[↑] [↑] [R↓] [CLx] [R↓]
ABAA	[↑] [↑] [R↓] [R↓]
ABAB	[↑] [↑] [CLx] [−] [R↓] [x≷y] [R↓]
ABAC	[↑] [R↓] [x≷y] [R↓] [R↓] [R↓]
ABAD	[R↓] [x≷y] [CLx] [−] [x≷y] [R↓] [x≷y] [x≷y] [R↓] [R↓] [CLx] [−] [R↓] [x≷y]
ABB0	[↑] [↑] [−] [R↓]
ABBA	[↑] [↑] [CLx] [−] [R↓]
ABBB	[↑] [↑] [−] [−]
ABBC	[x≷y] [↑] [R↓] [R↓] [x≷y] [R↓]
ABBD	[R↓] [R↓] [CLx] [−] [R↓]
ABC0	[0] [R↓]
ABCA	[↑] [R↓]
ABCB	[x≷y] [↑] [R↓] [x≷y]
ABCC	[0] [−]
ABCD	[x≷y] [x≷y]
ABD0	[R↓] [R↓] [CLx] [x≷y] [R↓] [R↓]
ABDA	[R↓] [x≷y] [CLx] [−] [R↓] [R↓] [R↓] [R↓] [R↓] [x≷y] [R↓] [R↓] [↑] [R↓]
ABDB	[R↓] [R↓] [CLx] [−] [R↓] [x≷y] [R↓]
ABDC	[R↓] [R↓] [x≷y] [R↓] [R↓]
ABDD	[R↓] [R↓] [R↓] [↑] [R↓] [R↓]

Table 2.5.1

AC00	[x≷y] [CLx] [↑] [R↓] [R↓]
AC0A	[x≷y] [0] [R↓] [R↓] [↑] [R↓]
AC0B	[x≷y] [0] [R↓] [R↓]
AC0C	[x≷y] [↑] [−] [R↓] [x≷y] [R↓]
AC0D	[R↓] [CLx] [x≷y] [R↓] [R↓] [R↓]
ACA0	[↑] [R↓] [x≷y] [CLx] [R↓]
ACAA	[↑] [R↓] [x≷y] [CLx] [−]
ACAB	[↑] [R↓] [x≷y] [R↓]
ACAC	[0] [−] [R↓] [CLx] [−] [R↓] [x≷y] [↑] [R↓] [R↓] [R↓] [↑] [R↓] [x≷y]
ACAD	[R↓] [CLx] [−] [x≷y] [R↓] [x≷y]
ACB0	[x≷y] [0] [x≷y] [R↓] [R↓] [x≷y] [↑] [R↓] [CLx] [R↓]
ACBA	[x≷y] [↑] [R↓] [R↓] [↑] [R↓]
ACBB	[x≷y] [↑] [R↓] [R↓]
ACBC	[0] [−] [x≷y] [R↓] [x≷y] [R↓] [x≷y] [0] [−] [R↓] [x≷y] [R↓]
ACBD	[R↓] [x≷y] [R↓] [R↓] [R↓]
ACC0	[x≷y] [↑] [−] [R↓]
ACCA	[0] [−] [x≷y] [R↓] [↑] [R↓] [x≷y] [↑] [−] [R↓] [↑] [R↓]
ACCB	[0] [−] [x≷y] [R↓] [x≷y] [0] [−] [R↓]
ACCC	[x≷y] [↑] [−] [−]
ACCD	[R↓] [R↓] [↑] [R↓] [R↓] [R↓]
ACD0	[x≷y] [CLx] [R↓]
ACDA	[x≷y] [R↓] [↑] [R↓]
ACDB	[x≷y] [R↓]
ACDC	[x≷y] [R↓] [x≷y] [↑] [R↓] [x≷y]
ACDD	[x≷y] [CLx] [−]

AD00	[x≷y] [CLx] [R↓] [x≷y] [CLx] [R↓] [R↓] [CLx] [R↓] [CLx] [R↓] [x≷y]
AD0A	[R↓] [−] [CLx] [x≷y] [R↓] [R↓] [R↓] [R↓] [CLx] [R↓] [R↓] [x≷y] [↑] [R↓]
AD0B	[R↓] [x≷y] [CLx] [R↓] [R↓] [x≷y]
AD0C	[x≷y] [CLx] [R↓] [x≷y] [R↓] [R↓] [CLx] [R↓] [R↓] [x≷y]
AD0D	[R↓] [CLx] [R↓] [R↓] [↑] [R↓] [x≷y]
ADA0	[R↓] [−] [CLx] [R↓] [x≷y]
ADAA	[R↓] [−] [CLx] [−] [x≷y]
ADAB	[R↓] [x≷y] [CLx] [−] [R↓] [x≷y]
ADAC	[R↓] [CLx] [−] [R↓] [x≷y]
ADAD	[R↓] [−] [R↓] [↑] [R↓] [x≷y]
ADB0	[x≷y] [R↓] [x≷y] [CLx] [R↓] [R↓] [R↓] [CLx] [R↓] [x≷y]
ADBA	[x≷y] [R↓] [x≷y] [R↓] [↑] [R↓] [R↓] [R↓] [R↓] [x≷y] [↑] [R↓]
ADBB	[R↓] [R↓] [CLx] [−] [x≷y]
ADBC	[x≷y] [R↓] [x≷y] [R↓] [R↓] [R↓] [R↓] [x≷y]
ADBD	[R↓] [R↓] [R↓] [↑] [R↓] [x≷y]
ADC0	[R↓] [CLx] [x≷y] [R↓] [R↓] [x≷y]
ADCA	[R↓] [CLx] [−] [x≷y] [R↓] [R↓] [R↓] [R↓] [x≷y] [R↓] [R↓] [x≷y] [↑] [R↓]
ADCB	[R↓] [x≷y] [R↓] [R↓] [x≷y]
ADCC	[x≷y] [R↓] [x≷y] [↑] [R↓] [R↓] [R↓] [R↓] [↑] [R↓] [R↓] [x≷y]
ADCD	[x≷y] [CLx] [−] [x≷y] [R↓] [x≷y] [R↓] [R↓] [x≷y] [R↓] [R↓] [↑] [R↓] [x≷y]
ADD0	[x≷y] [R↓] [x≷y] [↑] [−] [R↓]
ADDA	[R↓] [−] [R↓] [↑] [R↓] [R↓] [R↓]
ADDB	[x≷y] [R↓] [R↓] [R↓] [↑] [R↓] [R↓] [R↓]
ADDC	[x≷y] [CLx] [−] [x≷y] [R↓]
ADDD	[x≷y] [R↓] [x≷y] [↑] [−] [−]

Table 2.5.1

	Column 1	Column 2
B000	[CLx] [↑] [↑] [R↓] [R↓] [R↓]	[0] [↑] [R↓] [X] [R↓]
B00A	[0] [↑] [R↓] [R↓] [R↓]	[x≷y] [0] [x≷y] [0] [x≷y]
B00B	[CLx] [x≷y] [0] [x≷y] [↑] [R↓]	
B00C	[CLx] [x≷y] [0] [x≷y]	
B00D	[R↓] [x≷y] [CLx] [x≷y] [0] [x≷y]	
B0A0	[x≷y] [0] [x≷y] [0] [R↓]	[x≷y] [0] [↑] [R↓] [x≷y]
B0AA	[↑] [↑] [R↓] [−] [x≷y]	[x≷y] [↑] [↑] [−] [x≷y]
B0AB	[x≷y] [0] [x≷y] [↑] [R↓]	
B0AC	[x≷y] [0] [x≷y]	
B0AD	[x≷y] [R↓] [x≷y] [CLx] [R↓] [R↓] [R↓]	[R↓] [R↓] [CLx] [R↓] [x≷y] [R↓] [R↓]
B0B0	[0] [x≷y] [↑] [−] [R↓] [x≷y]	[CLx] [x≷y] [↑] [↑] [CLx] [x≷y]
B0BA	[x≷y] [↑] [↑] [CLx] [x≷y]	
B0BB	[CLx] [x≷y] [↑] [↑] [R↓] [R↓]	[↑] [↑] [−] [X] [x≷y]
B0BC	[R↓] [↑] [↑] [CLx] [x≷y]	
B0BD	[x≷y] [R↓] [−] [CLx] [x≷y] [R↓] [x≷y]	[R↓] [x≷y] [R↓] [↑] [↑] [CLx] [x≷y]
B0C0	[CLx] [x≷y] [0] [R↓]	[CLx] [↑] [R↓] [x≷y]
B0CA	[0] [x≷y] [R↓] [x≷y]	[↑] [R↓] [CLx] [x≷y]
B0CB	[CLx] [x≷y] [↑] [R↓]	
B0CC	[↑] [−] [x≷y]	
B0CD	[CLx] [x≷y]	
B0D0	[CLx] [R↓] [x≷y] [CLx] [x≷y]	
B0DA	[R↓] [x≷y] [CLx] [x≷y]	
B0DB	[R↓] [x≷y] [CLx] [x≷y] [↑] [R↓]	
B0DC	[R↓] [x≷y] [0] [x≷y] [R↓] [x≷y]	[R↓] [x≷y] [↑] [R↓] [CLx] [x≷y]
B0DD	[R↓] [x≷y] [↑] [−] [x≷y]	[CLx] [−] [x≷y] [CLx] [x≷y]

	Column 1	Column 2
BA00	[x≷y] [0] [↑] [R↓] [R↓]	
BA0A	[↑] [↑] [R↓] [CLx] [R↓] [R↓]	
BA0B	[x≷y] [↑] [↑] [CLx] [R↓] [R↓]	
BA0C	[0] [x≷y] [R↓] [R↓] [x≷y] [R↓]	[↑] [R↓] [CLx] [R↓] [x≷y] [R↓]
BA0D	[x≷y] [R↓] [R↓] [CLx] [R↓] [R↓]	[R↓] [R↓] [CLx] [R↓] [R↓] [x≷y]
BAA0	[↑] [↑] [R↓] [−] [R↓]	
BAAA	[↑] [↑] [R↓] [R↓] [R↓]	
BAAB	[x≷y] [↑] [↑] [CLx] [−] [R↓]	
BAAC	[↑] [R↓] [R↓] [x≷y] [R↓]	
BAAD	[R↓] [x≷y] [CLx] [−] [x≷y] [R↓]	[x≷y] [R↓] [R↓] [CLx] [−] [R↓]
BAB0	[↑] [↑] [−] [R↓] [x≷y]	
BABA	[↑] [↑] [CLx] [−] [R↓] [x≷y]	
BABB	[x≷y] [↑] [↑] [R↓] [R↓]	
BABC	[x≷y] [↑] [R↓] [x≷y] [R↓] [R↓] [R↓]	
BABD	[R↓] [R↓] [CLx] [−] [R↓] [x≷y]	
BAC0	[x≷y] [0] [R↓]	
BACA	[↑] [R↓] [x≷y]	
BACB	[x≷y] [↑] [R↓]	
BACC	[0] [−] [x≷y]	[x≷y] [0] [−]
BACD	[x≷y]	
BAD0	[x≷y] [R↓] [R↓] [CLx] [x≷y] [R↓] [R↓]	[R↓] [R↓] [CLx] [x≷y] [R↓] [R↓] [x≷y]
BADA	[R↓] [x≷y] [CLx] [−] [R↓] [R↓] [R↓] [x≷y]	[R↓] [R↓] [x≷y] [R↓] [R↓] [↑] [R↓] [x≷y]
BADB	[R↓] [R↓] [CLx] [−] [R↓] [x≷y] [R↓] [x≷y]	[R↓] [R↓] [x≷y] [R↓] [R↓] [x≷y] [↑] [R↓]
BADC	[x≷y] [R↓] [R↓] [x≷y] [R↓] [R↓]	[R↓] [R↓] [x≷y] [R↓] [R↓] [x≷y]
BADD	[x≷y] [R↓] [R↓] [R↓] [↑] [R↓] [R↓]	[R↓] [R↓] [R↓] [↑] [R↓] [R↓] [x≷y]

Table 2.5.1

BB00	`CLx` `x≷y` `0` `x≷y` `↑`
BB0A	`x≷y` `0` `x≷y` `↑`
BB0B	`CLx` `x≷y` `↑` `↑` `R↓`
BB0C	`CLx` `x≷y` `↑`
BB0D	`R↓` `x≷y` `CLx` `x≷y` `↑`
BBA0	`x≷y` `↑` `↑` `CLx` `R↓`
BBAA	`x≷y` `↑` `↑` `CLx` `−`
BBAB	`x≷y` `↑` `↑` `R↓`
BBAC	`x≷y` `↑`
BBAD	`R↓` `R↓` `CLx` `−` `x≷y` `R↓` `R↓`
BBB0	`CLx` `x≷y` `↑` `↑`
BBBA	`x≷y` `↑` `↑`
BBBB	`R↓` `↑` `↑` `↑`
BBBC	`R↓` `↑` `↑`
BBBD	`R↓` `x≷y` `R↓` `↑` `↑`
BBC0	`0` `R↓` `R↓` `↑`
BBCA	`↑` `R↓` `R↓` `↑`
BBCB	`R↓` `↑` `↑` `R↓`
BBCC	`↑` `−` `R↓` `↑`
BBCD	`R↓` `↑`
BBD0	`CLx` `R↓` `x≷y` `R↓` `↑`
BBDA	`R↓` `x≷y` `R↓` `↑`
BBDB	`R↓` `x≷y` `R↓` `↑` `↑` `R↓`
BBDC	`R↓` `x≷y` `↑` `R↓` `R↓` `↑`
BBDD	`CLx` `−` `x≷y` `R↓` `↑`

BC00	`CLx` `↑` `R↓` `R↓`	
BC0A	`0` `R↓` `R↓`	
BC0B	`0` `R↓` `R↓` `↑` `R↓`	
BC0C	`↑` `−` `R↓` `x≷y` `R↓`	
BC0D	`CLx` `x≷y` `R↓` `x≷y` `R↓` `R↓` `R↓`	`CLx` `R↓` `R↓` `R↓` `x≷y` `R↓` `R↓`
BCA0	`0` `x≷y` `R↓` `R↓`	`↑` `R↓` `CLx` `R↓`
BCAA	`↑` `R↓` `R↓`	
BCAB	`↑` `R↓` `R↓` `↑` `R↓`	
BCAC	`0` `−` `R↓` `x≷y` `R↓`	
BCAD	`x≷y` `R↓` `x≷y` `R↓` `R↓` `R↓`	`R↓` `R↓` `R↓` `x≷y` `R↓` `R↓`
BCB0	`CLx` `x≷y` `↑` `R↓` `x≷y` `R↓`	`R↓` `↑` `↑` `R↓` `CLx` `R↓`
BCBA	`x≷y` `↑` `R↓` `x≷y` `R↓`	
BCBB	`R↓` `↑` `↑` `R↓` `R↓`	
BCBC	`↑` `−` `R↓` `↑` `R↓` `x≷y` `R↓`	
BCBD	`R↓` `↑` `R↓` `x≷y` `R↓` `R↓` `R↓`	
BCC0	`↑` `−` `R↓`	
BCCA	`0` `−` `R↓`	
BCCB	`↑` `−` `R↓` `↑` `R↓`	
BCCC	`↑` `−` `−`	
BCCD	`CLx` `R↓` `R↓` `R↓` `+` `R↓`	
BCD0	`CLx` `R↓`	
BCDA	`R↓`	
BCDB	`R↓` `↑` `R↓`	
BCDC	`R↓` `x≷y` `↑` `R↓` `x≷y`	
BCDD	`CLx` `−`	

Table 2.5.1

BD00	CLx R↓ x≷y CLx R↓
BD0A	R↓ R↓ CLx x≷y R↓ R↓ R↓
BD0B	CLx R↓ x≷y R↓ ↑ R↓
BD0C	CLx R↓ x≷y R↓
BD0D	R↓ x≷y ↑ − R↓ x≷y R↓ CLx − R↓ CLx R↓ R↓ x≷y
BDA0	R↓ x≷y CLx R↓
BDAA	R↓ x≷y CLx −
BDAB	R↓ x≷y R↓ ↑ R↓
BDAC	**R↓ x≷y R↓**
BDAD	x≷y R↓ R↓ R↓ ↑ R↓ x≷y
BDB0	R↓ ↑ R↓ x≷y CLx R↓
BDBA	R↓ R↓ CLx − x≷y R↓ x≷y
BDBB	x≷y R↓ − CLx − x≷y R↓ ↑ R↓ x≷y CLx −
BDBC	R↓ ↑ R↓ x≷y R↓
BDBD	CLx − R↓ CLx − R↓ x≷y x≷y R↓ − R↓ ↑ R↓ x≷y
BDC0	R↓ x≷y 0 x≷y R↓ R↓ R↓ x≷y ↑ R↓ CLx R↓
BDCA	**R↓ R↓ x≷y R↓ R↓ R↓**
BDCB	R↓ x≷y ↑ R↓ R↓ ↑ R↓
BDCC	R↓ x≷y ↑ R↓ R↓
BDCD	CLx − x≷y R↓ x≷y R↓ CLx − R↓ R↓ R↓ x≷y
BDD0	R↓ x≷y ↑ − R↓
BDDA	R↓ R↓ R↓ ↑ R↓ R↓ R↓
BDDB	CLx − x≷y R↓ ↑ R↓
BDDC	CLx − x≷y R↓
BDDD	R↓ x≷y ↑ − −

C000	0 R↓ − CLx R↓ CLx ↑ R↓ × R↓
C00A	0 R↓ R↓ CLx x≷y
C00B	CLx ↑ R↓ R↓ R↓
C00C	↑ − R↓ CLx R↓ R↓
C00D	R↓ CLx x≷y 0 x≷y
C0A0	0 R↓ R↓ CLx R↓
C0AA	↑ R↓ R↓ CLx x≷y
C0AB	0 R↓ R↓ R↓
C0AC	x≷y ↑ − R↓ R↓ R↓
C0AD	x≷y R↓ x≷y 0 x≷y
C0B0	CLx x≷y 0 R↓ R↓ R↓ CLx ↑ R↓ x≷y R↓ R↓
C0BA	x≷y 0 R↓ R↓ R↓
C0BB	0 R↓ R↓ ↑ R↓ R↓ x≷y ↑ R↓ R↓ CLx x≷y
C0BC	↑ − R↓ R↓ R↓
C0BD	R↓ x≷y 0 x≷y
C0C0	↑ − R↓ CLx x≷y
C0CA	0 − R↓ CLx x≷y
C0CB	↑ − x≷y R↓ x≷y
C0CC	↑ − − CLx x≷y ↑ − × x≷y
C0CD	R↓ R↓ ↑ ↑ CLx x≷y
C0D0	CLx R↓ CLx x≷y
C0DA	R↓ CLx x≷y
C0DB	CLx x≷y R↓ x≷y
C0DC	R↓ CLx x≷y ↑ R↓
C0DD	− CLx x≷y

Table 2.5.1

Code	Sequence		Sequence (cont.)
CA00	`0` `x≷y` `R↓` `R↓` `CLx` `R↓`		`x≷y` `CLx` `↑` `R↓` `R↓` `x≷y`
CA0A	`↑` `R↓` `x≷y` `CLx` `R↓` `R↓`		
CA0B	`0` `x≷y` `R↓` `R↓` `R↓`		`↑` `R↓` `CLx` `R↓` `R↓`
CA0C	`0` `−` `R↓` `CLx` `R↓` `R↓`		
CA0D	`R↓` `CLx` `R↓` `x≷y` `R↓`		
CAA0	`↑` `R↓` `R↓` `CLx` `R↓`		
CAAA	`↑` `R↓` `R↓` `CLx` `−`		
CAAB	`↑` `R↓` `R↓` `R↓`		
CAAC	`0` `−` `R↓` `CLx` `−` `R↓`		`↑` `R↓` `R↓` `R↓` `↑` `R↓`
CAAD	`R↓` `CLx` `−` `x≷y` `R↓`		
CAB0	`R↓` `R↓` `x≷y` `CLx` `R↓`		
CABA	`↑` `R↓` `x≷y` `R↓` `R↓`		
CABB	`x≷y` `↑` `R↓` `R↓` `x≷y`		
CABC	`0` `−` `R↓` `R↓` `R↓`		
CABD	`R↓` `R↓` `x≷y` `R↓`		
CAC0	`x≷y` `↑` `−` `R↓` `x≷y`		
CACA	`0` `−` `x≷y` `R↓` `↑` `R↓` `x≷y`		`x≷y` `↑` `−` `R↓` `↑` `R↓` `x≷y`
CACB	`0` `−` `x≷y` `R↓` `x≷y`		`x≷y` `0` `−` `R↓` `x≷y`
CACC	`x≷y` `↑` `−` `−` `x≷y`		
CACD	`R↓` `R↓` `↑` `R↓` `x≷y` `R↓`		
CAD0	`x≷y` `CLx` `R↓` `x≷y`		
CADA	`x≷y` `R↓` `↑` `R↓` `x≷y`		
CADB	`x≷y` `R↓` `x≷y`		
CADC	`x≷y` `R↓` `x≷y` `↑` `R↓`		
CADD	`x≷y` `CLx` `−` `x≷y`		

Code	Sequence		Sequence (cont.)
CB00	`CLx` `↑` `R↓` `R↓` `x≷y`		
CB0A	`0` `R↓` `R↓` `x≷y`		
CB0B	`0` `R↓` `R↓` `↑` `R↓` `x≷y`		
CB0C	`↑` `−` `x≷y` `R↓` `R↓` `R↓`		
CB0D	`CLx` `x≷y` `R↓` `R↓` `x≷y` `R↓`		
CBA0	`0` `x≷y` `R↓` `R↓` `x≷y`		`↑` `R↓` `CLx` `R↓` `x≷y`
CBAA	`↑` `R↓` `R↓` `x≷y`		
CBAB	`x≷y` `↑` `R↓` `x≷y` `R↓` `R↓`		
CBAC	`0` `−` `x≷y` `R↓` `R↓` `R↓`		`↑` `R↓` `R↓` `x≷y` `↑` `R↓`
CBAD	`x≷y` `R↓` `R↓` `x≷y` `R↓`		
CBB0	`CLx` `x≷y` `↑` `R↓` `R↓` `R↓`		
CBBA	`x≷y` `↑` `R↓` `R↓` `R↓`		
CBBB	`R↓` `↑` `↑` `R↓` `R↓` `R↓`		
CBBC	`↑` `−` `x≷y` `R↓` `−` `R↓`		
CBBD	`R↓` `↑` `R↓` `R↓` `x≷y` `R↓`		
CBC0	`↑` `−` `R↓` `x≷y`		
CBCA	`0` `−` `R↓` `x≷y`		
CBCB	`↑` `−` `R↓` `↑` `R↓` `x≷y`		
CBCC	`↑` `−` `−` `x≷y`		
CBCD	`x≷y` `R↓` `R↓` `↑` `R↓` `x≷y` `R↓`		
CBD0	`CLx` `R↓` `x≷y`		
CBDA	`R↓` `x≷y`		
CBDB	`R↓` `↑` `R↓` `x≷y`		
CBDC	`R↓` `x≷y` `↑` `R↓`		
CBDD	`CLx` `−` `x≷y`		

Table 2.5.1

CC00	↑ − R↓ CLx R↓	
CC0A	x≷y ↑ − R↓ R↓	
CC0B	↑ − R↓ R↓	
CC0C	↑ − − CLx R↓ R↓	↑ − x R↓ R↓
CC0D	R↓ CLx x≷y ↑	
CCA0	0 − R↓ CLx R↓	
CCAA	0 − R↓ CLx −	↑ R↓ R↓ R↓ ↑
CCAB	0 − R↓ R↓	
CCAC	x≷y ↑ − − R↓ R↓	x≷y R↓ x≷y ↑ ↑ R↓
CCAD	x≷y R↓ x≷y ↑	
CCB0	↑ − x≷y R↓ R↓	
CCBA	0 − x≷y R↓ R↓	x≷y 0 − R↓ R↓
CCBB	↑ − x≷y R↓ −	
CCBC	↑ − − R↓ R↓	R↓ x≷y ↑ ↑ R↓
CCBD	R↓ x≷y ↑	
CCC0	↑ − − CLx R↓	↑ − x R↓
CCCA	x≷y ↑ − − R↓	
CCCB	↑ − − R↓	
CCCC	↑ − − CLx −	↑ − x −
CCCD	R↓ R↓ ↑ ↑	
CCD0	CLx R↓ R↓ ↑	
CCDA	R↓ R↓ ↑	
CCDB	x≷y R↓ R↓ ↑	
CCDC	R↓ R↓ ↑ ↑ R↓	
CCDD	− R↓ ↑	

CD00	CLx R↓ CLx R↓	
CD0A	x≷y CLx R↓ R↓	
CD0B	CLx R↓ R↓	
CD0C	CLx R↓ R↓ ↑ R↓	
CD0D	− CLx R↓ x≷y R↓	
CDA0	R↓ CLx R↓	
CDAA	R↓ CLx −	
CDAB	R↓ R↓	
CDAC	R↓ R↓ ↑ R↓	
CDAD	x≷y CLx − R↓ x≷y R↓	R↓ R↓ x≷y ↑ R↓ x≷y
CDB0	CLx x≷y R↓ R↓	
CDBA	x≷y R↓ R↓	
CDBB	R↓ ↑ R↓ R↓	
CDBC	x≷y R↓ R↓ ↑ R↓	
CDBD	CLx − R↓ x≷y R↓	
CDC0	R↓ CLx x≷y ↑ R↓ x≷y R↓	R↓ R↓ ↑ ↑ R↓ CLx R↓
CDCA	x≷y R↓ x≷y ↑ R↓ x≷y R↓	
CDCB	R↓ x≷y ↑ R↓ x≷y R↓	
CDCC	R↓ R↓ ↑ ↑ R↓ R↓	
CDCD	− R↓ ↑ R↓ x≷y R↓	
CDD0	− CLx R↓	
CDDA	x≷y CLx − R↓	
CDDB	CLx − R↓	
CDDC	− R↓ ↑ R↓	
CDDD	− CLx −	

Table 2.5.1

D000	[CLx] [R↓] [−] [CLx] [R↓] [CLx] [R↓] [CLx] [×] [R↓]
D00A	[x≷y] [CLx] [R↓] [R↓] [CLx] [x≷y]
D00B	[CLx] [R↓] [R↓] [CLx] [x≷y]
D00C	[CLx] [R↓] [CLx] [R↓] [R↓]
D00D	[−] [CLx] [R↓] [CLx] [R↓] [R↓]
D0A0	[R↓] [CLx] [R↓] [CLx] [x≷y]
D0AA	[R↓] [−] [CLx] [x≷y]
D0AB	[R↓] [R↓] [CLx] [x≷y]
D0AC	[x≷y] [CLx] [R↓] [R↓] [R↓]
D0AD	[R↓] [R↓] [CLx] [x≷y] [↑] [R↓]
D0B0	[CLx] [R↓] [R↓] [CLx] [R↓]
D0BA	[x≷y] [R↓] [R↓] [CLx] [x≷y]
D0BB	[x≷y] [R↓] [−] [CLx] [x≷y] [CLx] [R↓] [R↓] [CLx] [−]
D0BC	[CLx] [R↓] [R↓] [R↓]
D0BD	[CLx] [R↓] [R↓] [R↓] [↑] [R↓]
D0C0	[CLx] [R↓] [CLx] [x≷y] [R↓] [R↓]
D0CA	[R↓] [R↓] [x≷y] [0] [x≷y]
D0CB	[CLx] [R↓] [x≷y] [R↓] [R↓]
D0CC	[CLx] [R↓] [R↓] [↑] [R↓] [R↓]
D0CD	[−] [CLx] [R↓] [R↓] [R↓]
D0D0	[−] [CLx] [R↓] [CLx] [x≷y]
D0DA	[x≷y] [CLx] [−] [R↓] [CLx] [x≷y]
D0DB	[CLx] [−] [R↓] [CLx] [x≷y]
D0DC	[−] [CLx] [x≷y] [R↓] [x≷y]
D0DD	[−] [−] [CLx] [x≷y]

DA00	[R↓] [CLx] [R↓] [CLx] [R↓]
DA0A	[R↓] [−] [CLx] [R↓] [x≷y] [R↓]
DA0B	[R↓] [x≷y] [CLx] [R↓] [R↓]
DA0C	[R↓] [CLx] [R↓] [R↓]
DA0D	[R↓] [CLx] [R↓] [R↓] [↑] [R↓]
DAA0	[R↓] [−] [CLx] [R↓]
DAAA	[R↓] [−] [CLx] [−]
DAAB	[R↓] [x≷y] [CLx] [−] [R↓]
DAAC	[R↓] [CLx] [−] [R↓]
DAAD	[R↓] [−] [R↓] [↑] [R↓]
DAB0	[R↓] [R↓] [CLx] [R↓]
DABA	[R↓] [x≷y] [CLx] [−] [R↓] [x≷y] [R↓] [R↓] [R↓] [R↓] [x≷y] [↑] [R↓] [x≷y]
DABB	[R↓] [R↓] [CLx] [−]
DABC	**[R↓] [R↓] [R↓]**
DABD	[R↓] [R↓] [R↓] [↑] [R↓]
DAC0	[R↓] [CLx] [x≷y] [R↓] [R↓]
DACA	[R↓] [CLx] [−] [R↓] [x≷y] [R↓]
DACB	**[R↓] [x≷y] [R↓] [R↓]**
DACC	[R↓] [R↓] [↑] [R↓] [R↓]
DACD	[x≷y] [CLx] [−] [R↓] [R↓] [R↓] [R↓] [x≷y] [R↓] [R↓] [↑] [R↓]
DAD0	[x≷y] [R↓] [x≷y] [↑] [−] [R↓] [x≷y]
DADA	[R↓] [−] [R↓] [↑] [R↓] [x≷y] [R↓]
DADB	[x≷y] [R↓] [R↓] [R↓] [↑] [R↓] [x≷y] [R↓]
DADC	[x≷y] [CLx] [−] [x≷y] [R↓] [x≷y]
DADD	[R↓] [R↓] [R↓] [↑] [↑] [R↓] [R↓]

Table 2.5.1

DB00	CLx	x≷y	R↓	R↓	CLx	R↓							
DB0A	x≷y	R↓	x≷y	CLx	R↓	R↓		R↓	R↓	CLx	R↓	x≷y	R↓
DB0B	R↓	↑	R↓	x≷y	CLx	R↓	R↓						
DB0C	CLx	x≷y	R↓	R↓	R↓								
DB0D	CLx	−	R↓	CLx	R↓	R↓							
DBA0	x≷y	R↓	R↓	CLx	R↓								
DBAA	R↓	x≷y	CLx	−	x≷y			x≷y	R↓	R↓	CLx	−	
DBAB	R↓	x≷y	R↓	↑	R↓	x≷y							
DBAC	**x≷y**	**R↓**	**R↓**	**R↓**									
DBAD	x≷y	R↓	R↓	R↓	↑	R↓							
DBB0	x≷y	R↓	−	CLx	R↓			CLx	x≷y	R↓	×	R↓	
DBBA	R↓	R↓	CLx	−	x≷y	R↓							
DBBB	x≷y	R↓	−	CLx	−								
DBBC	R↓	↑	R↓	R↓	R↓								
DBBD	CLx	−	R↓	CLx	−	R↓		x≷y	R↓	−	R↓	↑	R↓
DBC0	CLx	x≷y	R↓	x≷y	R↓	R↓		R↓	R↓	R↓	x≷y	CLx	R↓
DBCA	**x≷y**	**R↓**	**x≷y**	**R↓**	**R↓**			**R↓**	**R↓**	**R↓**	**x≷y**	**R↓**	
DBCB	R↓	↑	R↓	x≷y	R↓	R↓							
DBCC	CLx	R↓	R↓	R↓	+								
DBCD	CLx	−	R↓	R↓	R↓								
DBD0	R↓	x≷y	↑	−	R↓	x≷y		CLx	−	x≷y	CLx	R↓	x≷y
DBDA	R↓	R↓	R↓	↑	R↓	x≷y	R↓						
DBDB	CLx	−	x≷y	R↓	↑	R↓	x≷y						
DBDC	CLx	−	x≷y	R↓	x≷y								
DBDD	R↓	x≷y	↑	−	−	x≷y							

DC00	CLx	R↓	CLx	R↓	x≷y							
DC0A	x≷y	CLx	R↓	R↓	x≷y							
DC0B	CLx	R↓	R↓	x≷y								
DC0C	CLx	R↓	R↓	↑	R↓	x≷y						
DC0D	−	CLx	x≷y	R↓	R↓	R↓		CLx	R↓	R↓	x≷y	↑	R↓
DCA0	R↓	CLx	R↓	x≷y								
DCAA	R↓	CLx	−	x≷y								
DCAB	**R↓**	**R↓**	**x≷y**									
DCAC	R↓	R↓	↑	R↓	x≷y							
DCAD	R↓	R↓	x≷y	↑	R↓							
DCB0	CLx	x≷y	R↓	R↓	x≷y							
DCBA	**x≷y**	**R↓**	**R↓**	**x≷y**								
DCBB	R↓	↑	R↓	R↓	x≷y							
DCBC	x≷y	R↓	R↓	↑	R↓	x≷y						
DCBD	CLx	−	x≷y	R↓	R↓	R↓		x≷y	R↓	R↓	x≷y	↑	R↓
DCC0	−	CLx	−	R↓	−	R↓		CLx	×	x≷y	R↓	×	R↓
DCCA	x≷y	R↓	x≷y	↑	R↓	R↓	R↓	R↓	R↓	↑	R↓	R↓	x≷y	R↓
DCCB	R↓	x≷y	↑	R↓	R↓	R↓						
DCCC	−	CLx	−	R↓	−	−		−	x≷y	R↓	−	CLx	−
DCCD	−	R↓	↑	R↓	R↓	R↓						
DCD0	−	CLx	R↓	x≷y								
DCDA	x≷y	CLx	−	R↓	x≷y							
DCDB	CLx	−	R↓	x≷y								
DCDC	−	R↓	↑	R↓	x≷y							
DCDD	−	CLx	−	x≷y								

Table 2.5.1

DD00	[−]	[CLx]	[R↓]	[CLx]	[R↓]
DD0A	[R↓]	[R↓]	[CLx]	[x≷y]	[↑]
DD0B	[CLx]	[R↓]	[R↓]	[R↓]	[↑]
DD0C	[−]	[CLx]	[R↓]	[R↓]	
DD0D	[−]	[−]	[CLx]	[R↓]	[R↓]
DDA0	[R↓]	[CLx]	[R↓]	[R↓]	[↑]
DDAA	[R↓]	[−]	[R↓]	[↑]	
DDAB	[R↓]	[R↓]	[R↓]	[↑]	
DDAC	[x≷y]	[CLx]	[−]	[R↓]	[R↓]
DDAD	[R↓]	[R↓]	[R↓]	[↑]	[↑] [R↓]
DDB0	[CLx]	[−]	[R↓]	[CLx]	[R↓]
DDBA	[x≷y]	[R↓]	[R↓]	[R↓]	[↑]
DDBB	[CLx]	[−]	[R↓]	[CLx]	[−]
DDBC	[CLx]	[−]	[R↓]	[R↓]	
DDBD	[CLx]	[−]	[R↓]	[R↓]	[↑] [R↓]
DDC0	[−]	[CLx]	[x≷y]	[R↓]	[R↓]
DDCA	[R↓]	[R↓]	[x≷y]	[↑]	
DDCB	[CLx]	[−]	[x≷y]	[R↓]	[R↓]
DDCC	[−]	[R↓]	[↑]	[R↓]	[R↓]
DDCD	[−]	[R↓]	[x≷y]	[↑]	
DDD0	[−]	[−]	[CLx]	[R↓]	
DDDA	[R↓]	[R↓]	[R↓]	[↑]	[↑]
DDDB	[CLx]	[−]	[R↓]	[R↓]	[↑]
DDDC	[−]	[CLx]	[−]	[R↓]	
DDDD	[−]	[−]	[CLx]	[−]	

Epilogue

No changes on this last page!

Table 2.5.1 is really very robust. I could only find 10 shorter solutions by cheating and using an additional operation – the [x]. Of those 10 I think I was most surprised by the CCCC solution.

In the tables I have made the "24 permutations of ABCD" bold, just because they are the only solutions that preserve the all the values, by using only the roll and swap operations (no [↑], [CLx], or anything else<G>).

In section 2.0 I also made BA0D, BAD0 and BADD bold, along with the BADC (one of the famous "24"), not because they are "BAD"<G>, but because they show alternative solutions which are neither better nor worse, just interesting.
On a second look they do fit into a pattern though – here I bring BA0D down to just before the sequence BAD0-BADD. You can see that BADA and BADB have been replaced by "faster" versions (although it could well be argued that execution speed is not important, especially for manual work).

BA0D	[x≷y] [R↓] [R↓] [CLx] [R↓] [R↓]	[R↓] [R↓] [CLx] [R↓] [R↓] [x≷y]
...		
BAD0	[x≷y] [R↓] [R↓] [CLx] [x≷y] [R↓] [R↓]	[R↓] [R↓] [CLx] [x≷y] [R↓] [R↓] [x≷y]
BADA	[R↓] [x≷y] [CLx] [−] [R↓] [R↓] [R↓] [x≷y]	[R↓] [R↓] [x≷y] [R↓] [R↓] [↑] [R↓] [x≷y]
BADB	[R↓] [R↓] [CLx] [−] [R↓] [x≷y] [R↓] [x≷y]	[R↓] [R↓] [x≷y] [R↓] [R↓] [x≷y] [↑] [R↓]
BADC	[x≷y] [R↓] [R↓] [x≷y] [R↓] [R↓]	[R↓] [R↓] [x≷y] [R↓] [R↓] [x≷y]
BADD	[x≷y] [R↓] [R↓] [R↓] [↑] [R↓] [R↓]	[R↓] [R↓] [R↓] [↑] [R↓] [R↓] [x≷y]

All the newer versions begin with [R↓] [R↓]. Not much of a pattern I grant, but probably worth a mention. Actually the real reason these turned up like this is that my "monkey at the keyboard" program generated sequences such that those beginning with [R↓] were done before those beginning with [x≷y]. Biased! Yes indeed, BADB can be replaced by [x≷y] [R↓] [R↓] [x≷y] [R↓] [R↓] [↑] [R↓], but BADA does not have another fast solution other than the one shown. So, maybe by pure luck we stumbled on a nice pattern indeed!

What a lot of fun! Many thanks to John Ball for his encouragement and advice which both expanded my vista and kept me straying into error early on. I claim all remaining errors as my own work<G>

tony.hutchins@attglobal.net