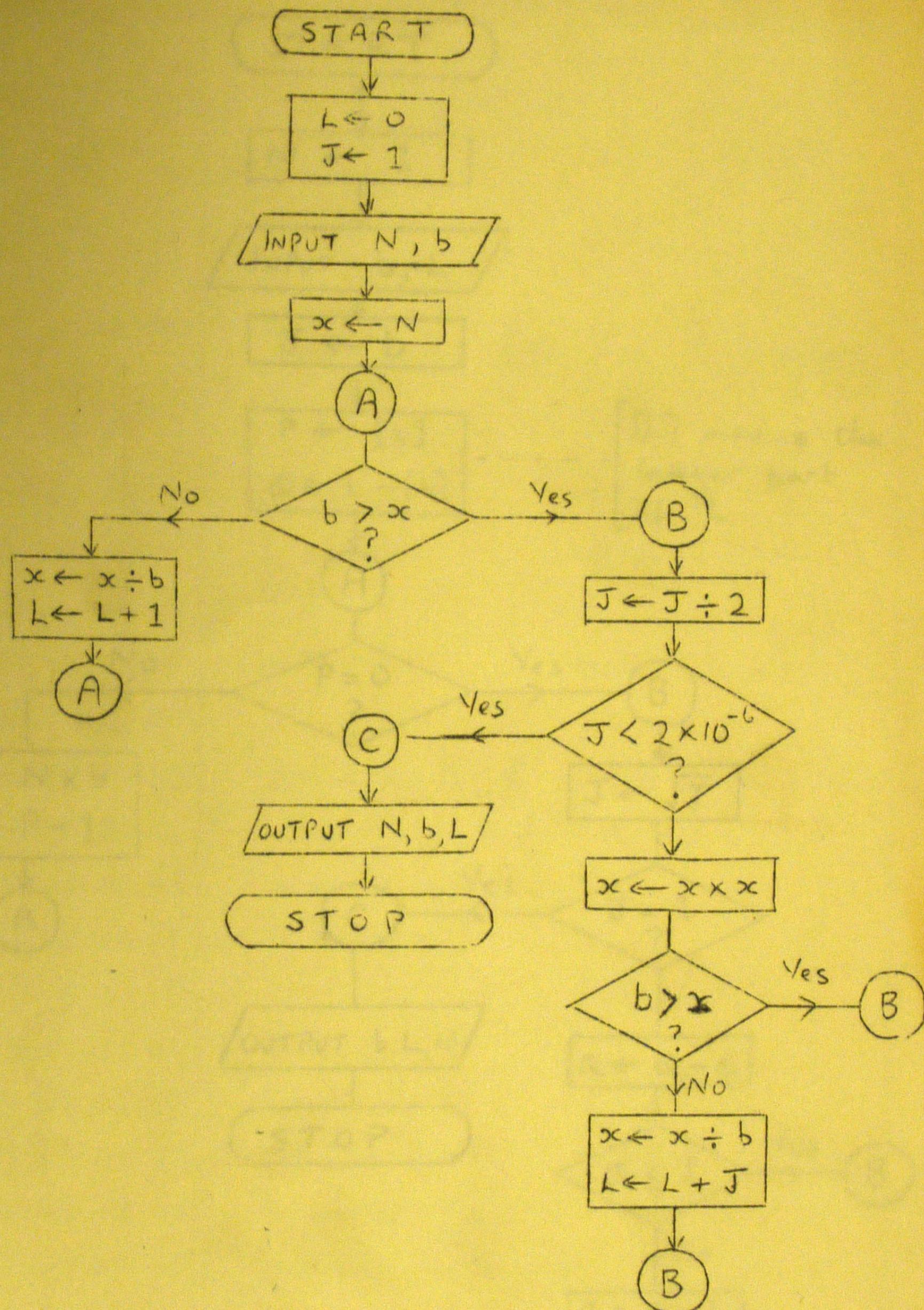
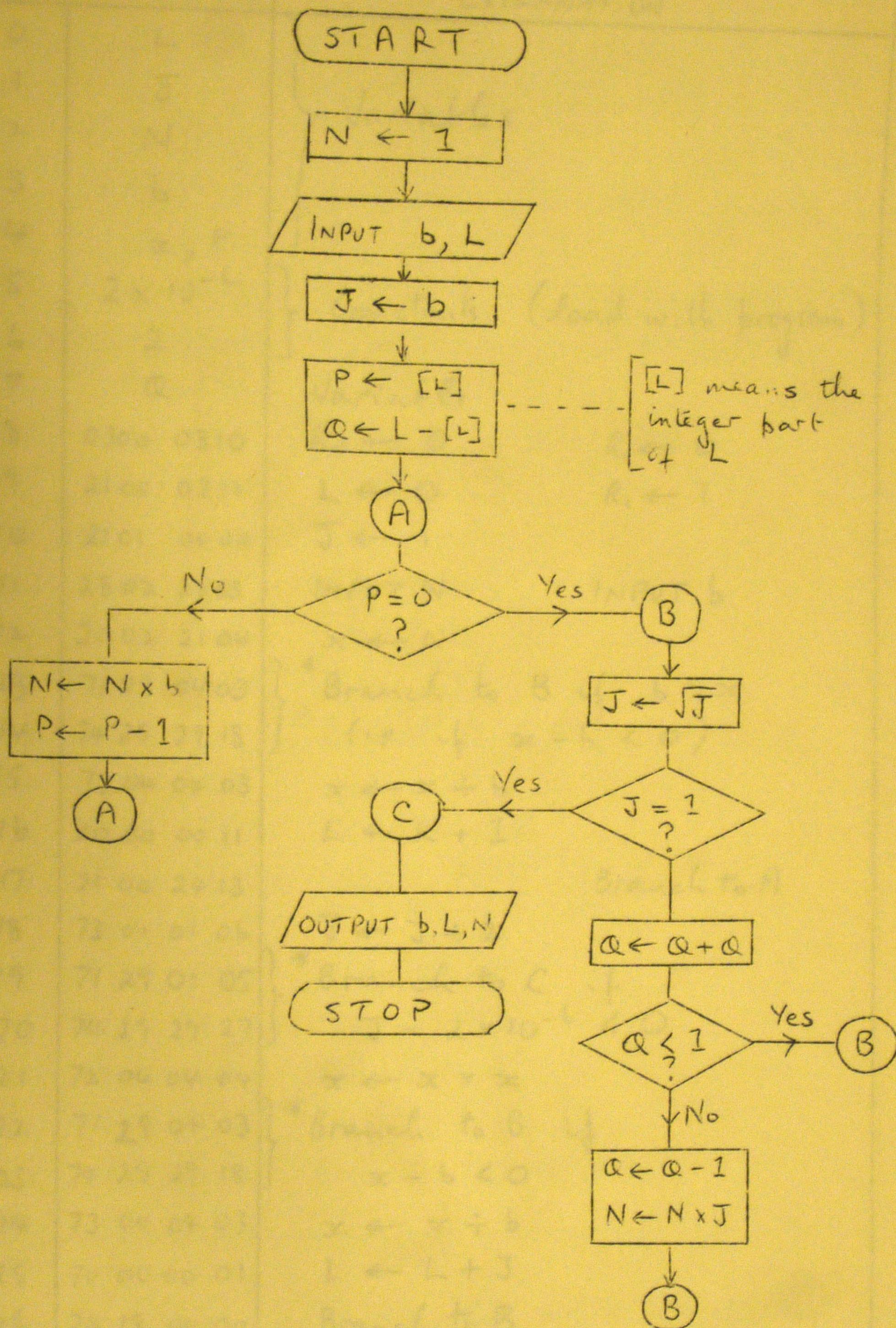


PROGRAMS FOR $\log_b N$ AND b^L Flow Diagram for $L \leftarrow \log_b N$ 

Flow Diagram for $N \leftarrow b^L$



5

Program for $L \leftarrow \log_b N$

ADDRESS	CONTENTS	EXPLANATION
0	L	
1	J	
2	N	
3	b	
4	x, P	
5	2×10^{-6}	
6	2	
7	Q	Variables
8	0300 0310	Constants (load with program)
9	2100 0311	
10	2101 0000	
11	2802 2803	
12	2002 2104	
(A) 13	7129 0403	R ₀ ← 0 R ₁ ← 0
14	7429 2918	L ← 0 R ₁ ← 1
15	7304 0403	J ← 1
16	2000 0011	INPUT N INPUT b
17	2100 2413	
(B) 18	7301 0106	x ← N
19	7129 0105	* Branch to B if b > x (i.e. if x - b < 0)
20	7429 2927	x ← x ÷ b
21	7204 0404	L ← L + 1
22	7129 0403	
23	7429 2918	Branch to A
24	7304 0403	x ← x × x
25	7000 0001	* Branch to C if $x - b < 0$
26	2418 0000	x ← x ÷ b
27	7902 0300	L ← L + J
28	2808 0000	Branch to B
(C) 29	Working	Display N, b, L Branch to START

* Branches employ the square root subroutine.

Program for $N \leftarrow b^L$

ADDRESS	CONTENTS	EXPLANATION
START →		
30	1	Constant (load with program)
31	73 02 30 30	$N \leftarrow 1$
32	28 03 28 00	INPUT b
33	20 03 21 01	$J \leftarrow b$
34	20 00 17 10	$(R_0 R_1) \leftarrow L$
35	03 00 21 04	$R_0 \leftarrow 0$
36	71 07 00 04	$P \leftarrow [L]$
37	20 04 05 10	Right shift R_1 by (R_0)
38	25 42 00 00	$P \leftarrow L - P$
(A)		* Branch to B if $P = 0$
39	01 11 21 04	$P \leftarrow P - 1$
40	72 02 02 03	$N \leftarrow N \times b$
41	24 37 00 00	Branch to A
42	74 01 01 30	$J \leftarrow \sqrt{J}$
43	20 01 01 11	* Branch to C if $J = 1$
44	05 10 25 51	
45	70 07 07 07	$Q \leftarrow Q + Q$
46	71 29 07 30	* Branch to B if $Q - 1 < 0$
47	74 29 29 42	
48	71 07 07 30	$Q \leftarrow Q - 1$
49	72 02 02 01	$N \leftarrow N \times J$
50	24 42 00 00	Branch to B
51	79 03 00 02	DISPLAY b, L, N
52	24 31 00 00	Branch to START

* These branches use register tests on the contents of R_0 and R_1

Both of the above programs use the square root subroutine

\Rightarrow "if $(ef) \geq 0$ then $(cd) \leftarrow \sqrt{(ef)}$ else go to gh"