HW3

1.

a) 1000 1111 1110 1111 1100 0000 0000 0000

flip bits: 0111 0000 0001 0000 0011 1111 1111 1111

add 1: 0111 0000 0001 0000 0100 0000 0000 0000

hex: 7 0 1 0 4 0 0 0

$7\times16^7 + 0\times16^6 + 1\times16^5 + 0\times16^4 + 4\times16^3 + 0\times16^2 + 0\times16^1 + 0\times16^0$

decimal: -1880113152

b) 1000 1111 1110 1111 1100 0000 0000 0000

sign | exponent | significand

1 2 3 4 5 6 7 8 9 10

$1.0110\ 1111\ 1100\ 0000\ 0000\ 0000 \times 2^{0001\ 1111 - 127}$

sig: $1 + 2^{-2} + 2^{-3} + 2^{-5} + 2^{-6} + 2^{-7} + 2^{-8} + 2^{-9} + 2^{-10} = 1.436523437_{16}5$

exp: $2^4 + 2^3 + 2^2 + 2^1 + 2^0 = 31$

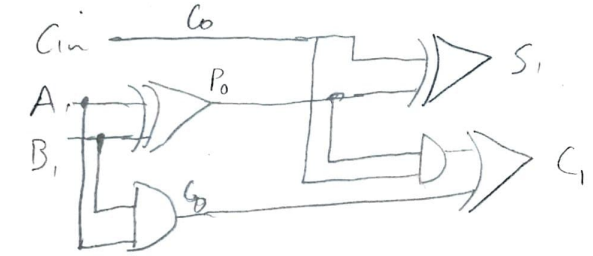
$1.436523437_{16}5 \times 2^{-96} = 1.813147_{16}5 \times 10^{-29}$

1. 1000 1111 1110 1111 1100 0000 0000 0000

opcode rs rt immediate

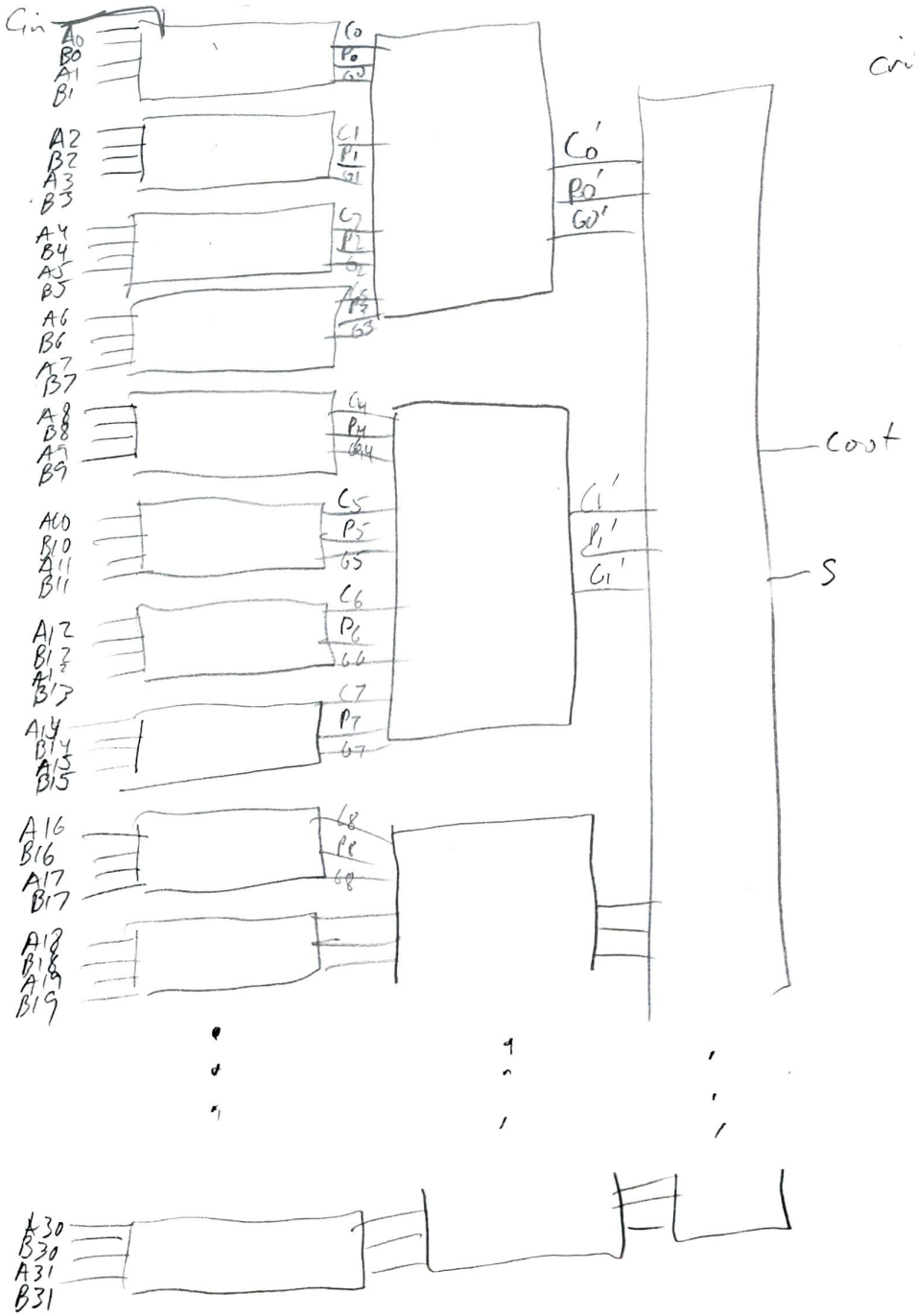
lw $ra, 0xC000($t7)

2.



$S = C_i \oplus P_i$

$C_{i+1} = C_i \cdot P_i + G_i$



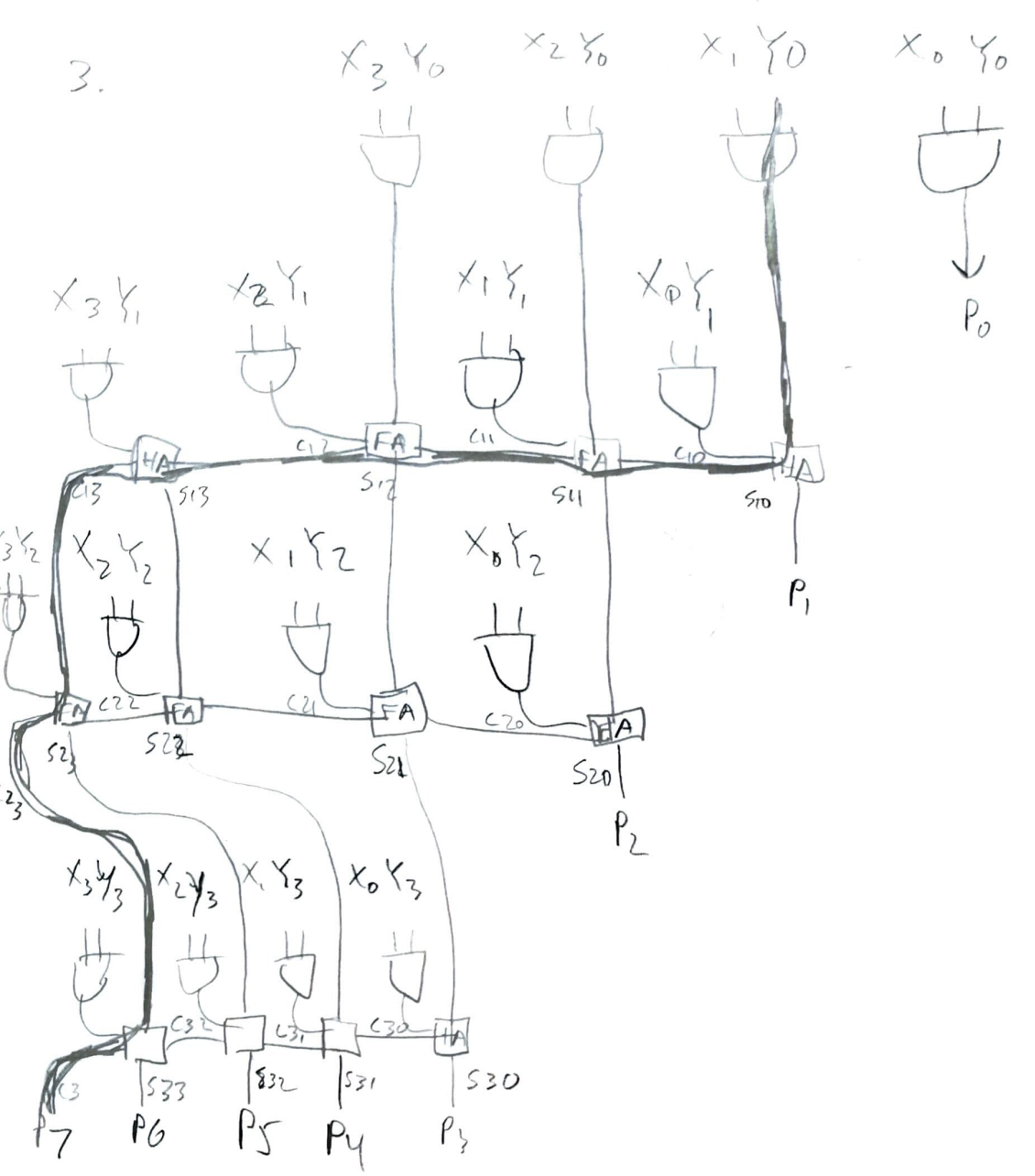
critical path:

$C_{in} \rightarrow C_0 \rightarrow C_0' \rightarrow C_{out}$

3 gates per level:

12 gate delays

3.



Critical Path: $Y_0 \to C_{10} \to C_{11} \to C_{12} \to C_{13} \to C_{23} \to C_3$

4. $1000.0625 = 1111101000.0001$ $10+127=137$

22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0

0 0 0 0 0 0 0 0 0, 1 1 1 1 1 0 1 0 0 0 0 0 0 1

$10+1023=1033$

32 bit: 01000100100000000011111010000001

Double : 01000000100100000000 00000000 00000000 00000000 00000000 00000000

00000011 11101000 00010000

5. I: $1.001 \times 2^2 =$ 01000001001 0000 0000 0000 0000 0000

$1.01000000000000000011 \times 2^1 =$

01000000010 0000 0000 0000 0000 0001

II shift bits:

001 0000 0000 0000 0000 0000

01 0000 0000 0000 0000 0001

add significands: 010 0000 0000 0000 0000 0000

a) $gr^c \rightarrow$

1

= 0100 00001010 0000 0000 0000 0000 0001

b) 0100 0000 1010 0000 0000 0000 0000 0000