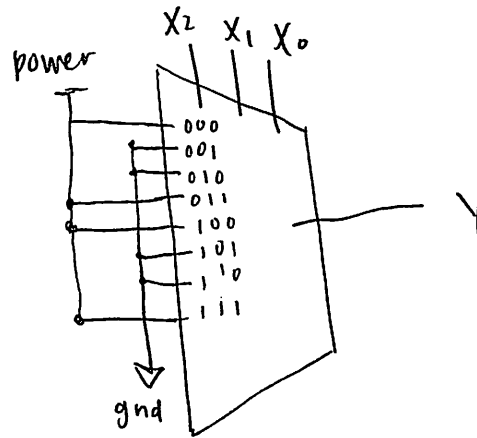


Homework 2 Written

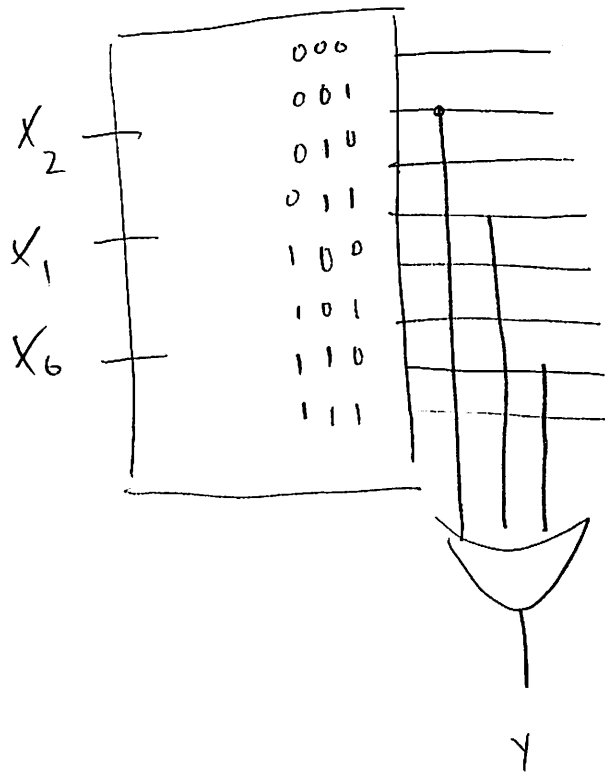
The pdf you submit must look exactly like this with the answers and all supporting works shown on the the page with the question.

Last Name	First Name	Student ID
Ahmed	Fareeha	999307283
Partner Last Name	Partner First Name	Partner Student ID

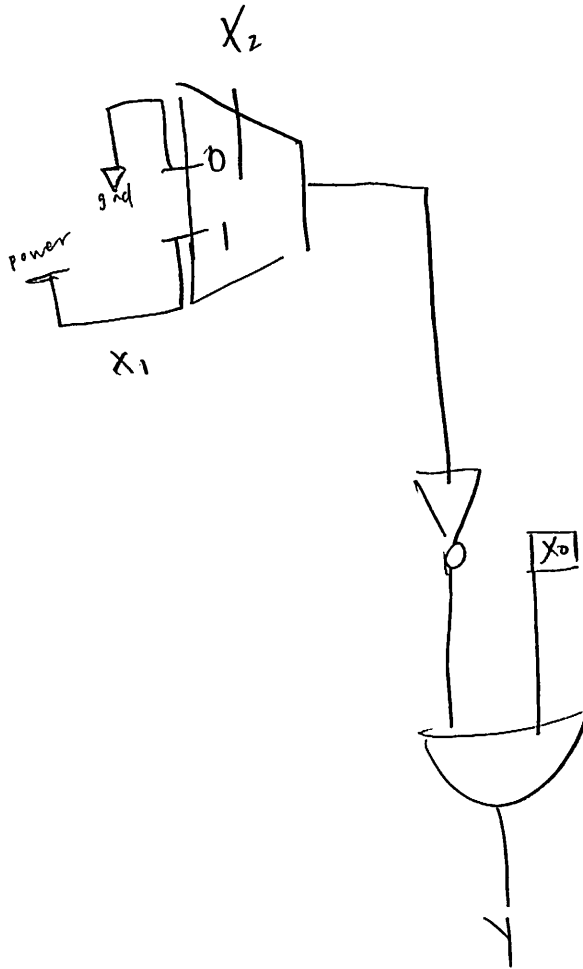
1. (4 points) Given only an 8-1 multiplexer and constants 0 and 1 implement a circuit that behaves like the following function: $m_0 + m_3 + m_4 + m_7$ There are 3 input variables for this problem x_2, x_1, x_0 .



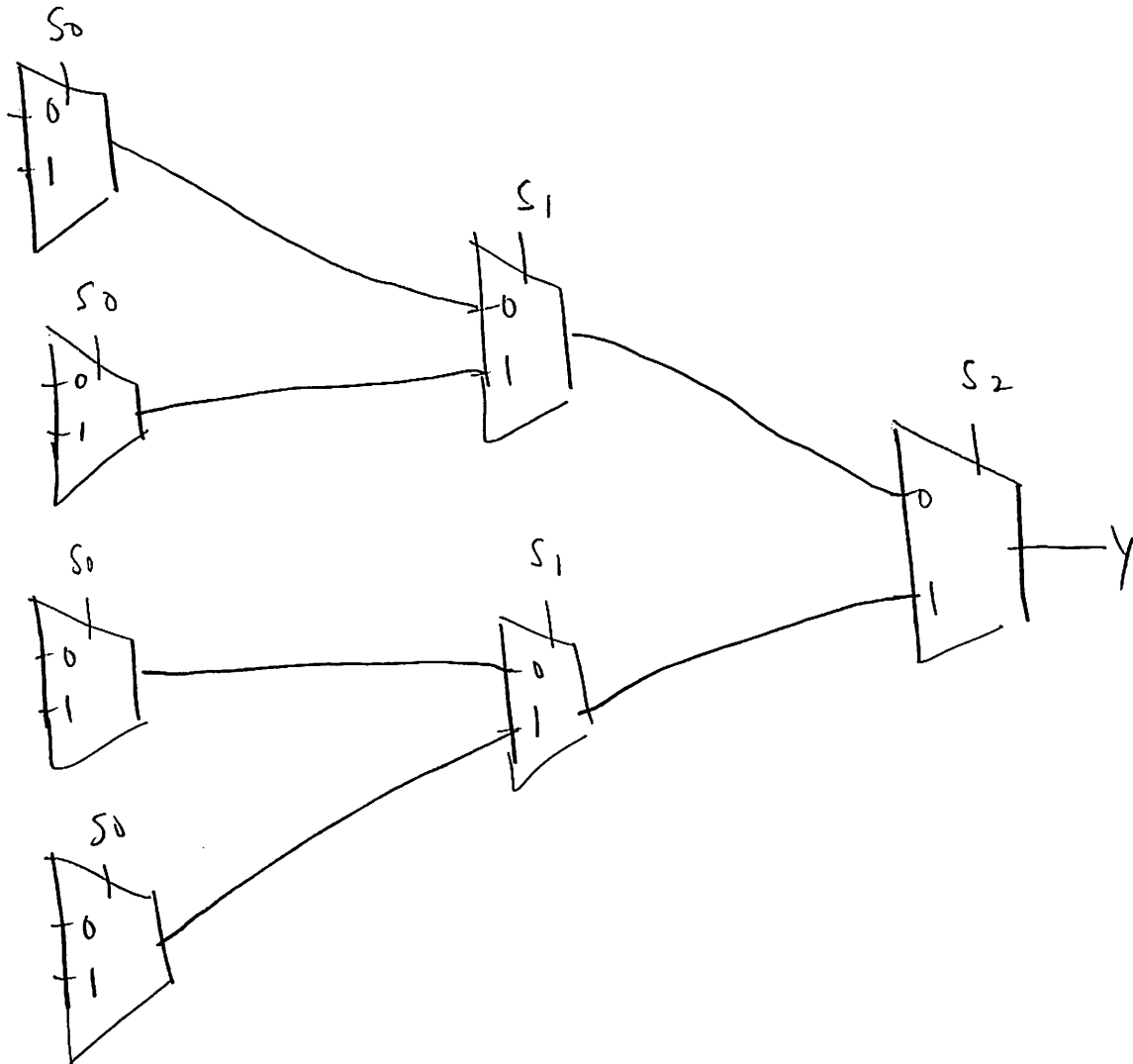
2. (3 points) Given only an 3-8 one hot decoder and an OR gate implement a circuit that behaves like the following function: $m_1 + m_3 + m_6$ There are 3 input variables for this problem x_2, x_1, x_0 .



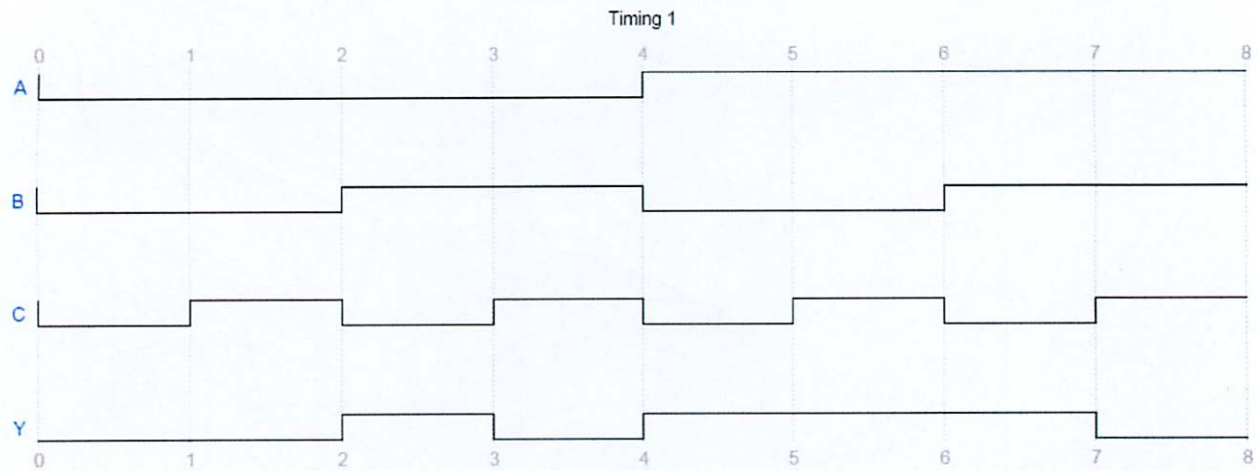
3. (3) Given only a 2:1 mux, a not gate, and a 2 input or gate implement a circuit that behaves like the following function: $M_2 \times M_4 \times M_6$ There are 3 input variables for this problem x_2, x_1, x_0 .



4. (3 points) Use only 2 – 1 multiplexers to create an 8-1 multiplexer.

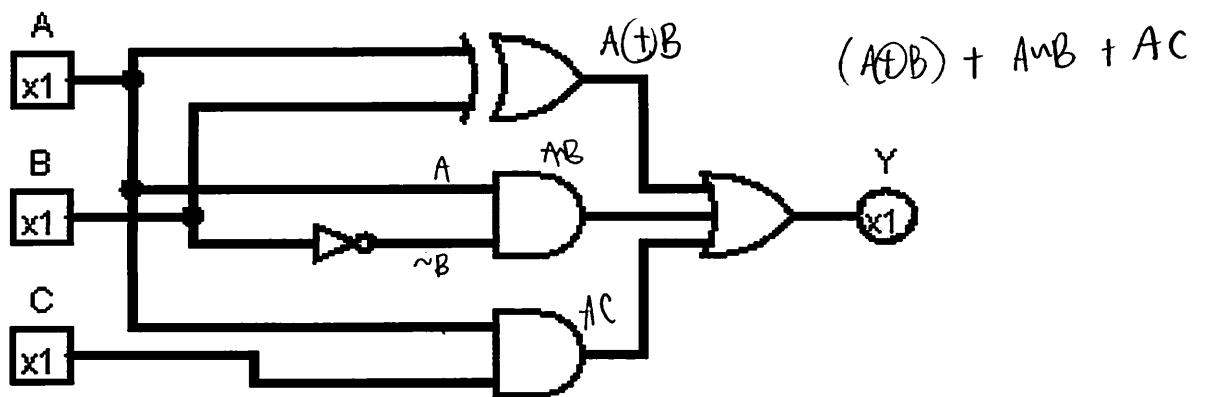


5. (4) Fill in the truth table based on the following timing diagram. Assume no delays in the circuit.



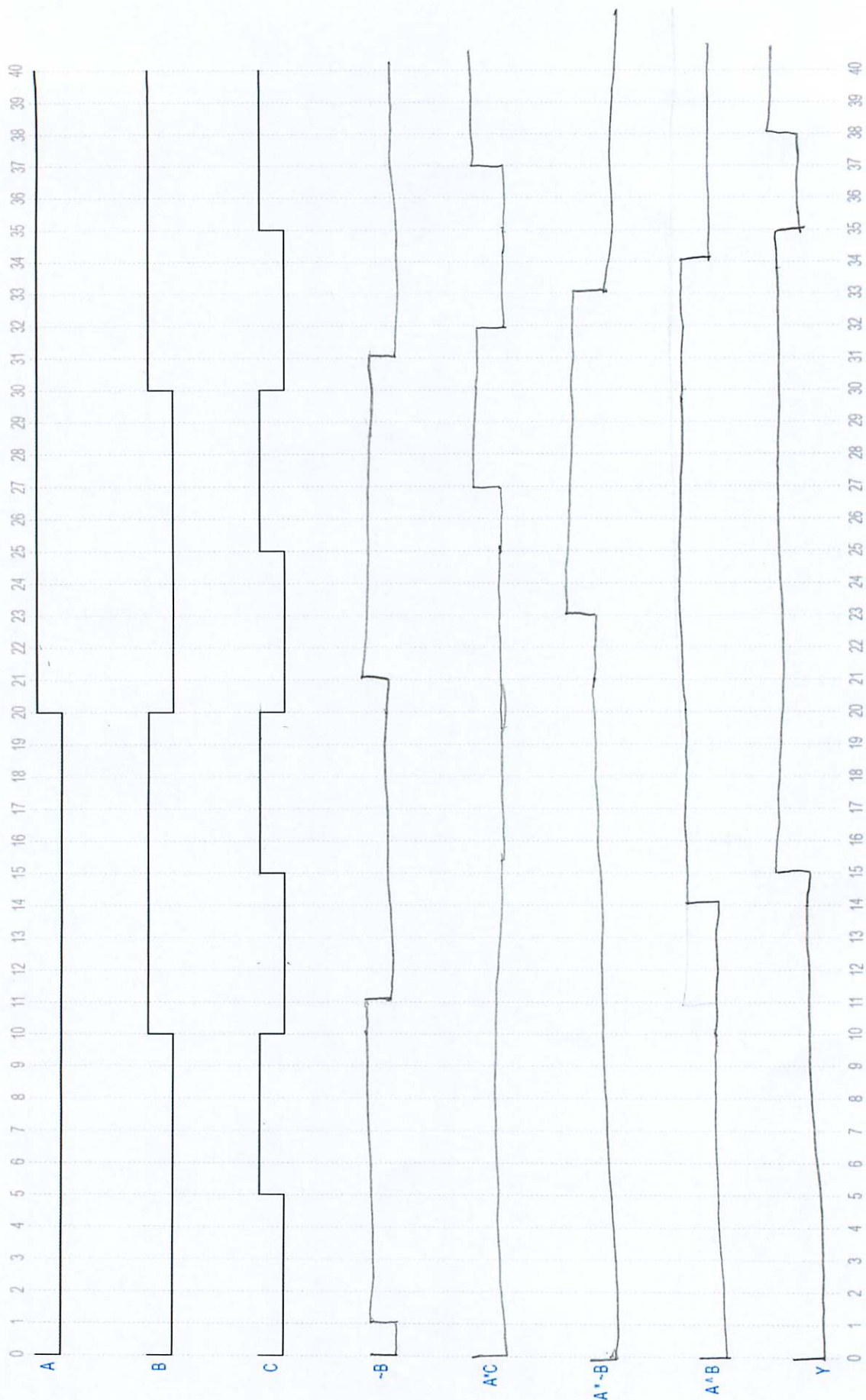
A	B	C	Y
0	0	0	0
0	0	1	0
0	1	0	1
0	1	1	0
1	0	0	1
1	0	1	1
1	1	0	1
1	1	1	0

6. (8) Give the following circuit and delays complete the timing diagram.



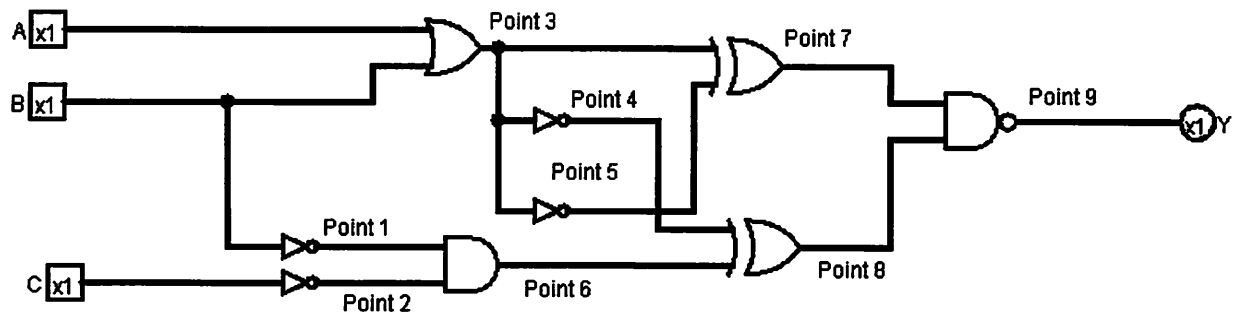
Element	Delay
NOT	1
AND	2
XOR	4
OR	1

Timing 2



7. (4.5 points) Given the following circuit and the propagation delays in the following table, what are the propagation delays at each marked point? There are 9 separate points.

Component	Delay
Not	1 ns
OR	3 ns
XOR	5 ns
NAND	3 ns
AND	4 ns



Point	Delay
1	1
2	1
3	3
4	4
5	4
6	5
7	9
8	10
9	13

8. (3 points) Given that each XOR gate has a delay of A ns, each AND gate has a delay of B ns, and each OR gate has a delay of C ns, what is the propagation delay of the worst case path in an N bit ripple carry adder? Assume that the delays between the elements are close enough that the worst case path is the one that contains the most elements along it.

$$(A + B + C)N$$