1. Design a Single cell -1 bit Carry propagate (Ripple Carry Adder) full adder. (6 pts)
   a. Generate the truth table
   b. Using K-map, determine the logical expression for Carry out (C-out) and Sum (S)
   c. Based on the logical expression, create the schematic diagram for full adder

2. Design a 1 bit, 2 to 1 multiplexer (Mux). Outputs Y when S = 0; X when S = 1. (6 pts)
   a. Generate the truth table
   b. Using K-map, determine the logical expression for output
   c. Based on the logical expression, create the schematic diagram for Mux

1a.)

Ax	Bx	Cx	Sx	Cout
0	0	0	0	0
0	0	1	1	0
0	1	0	1	0
0	1	1	0	1
1	0	0	1	0
1	0	1	0	1
1	1	0	0	1
1	1	1	1	1

R1
R2
R3
R4
R5
R6
R7
R8

↖ inputs   ↖ outputs

1b.)

BC_i

Sum:

A \	00	01	11	10
0	0	1	0	1
1	1	0	1	0

BC_i

Cout:

A \	00	01	11	10
0	0	0	1	0
1	0	1	1	1

$Sx = \overline{A}B\overline{C} + AB\overline{C} + \overline{A}\,\overline{B}C + AB\overline{C}$

$Sx = A\overline{B}C + \overline{A}B\overline{C} + \overline{A}\,\overline{B}C + AB\overline{C}$

$= A \oplus B \oplus C$

$Cout = AC + BC + AB$

$= AB + (A \oplus B)C$

1c.) Ax Bx Cx

Sx

A1
A2
A3

Cout

2a.)
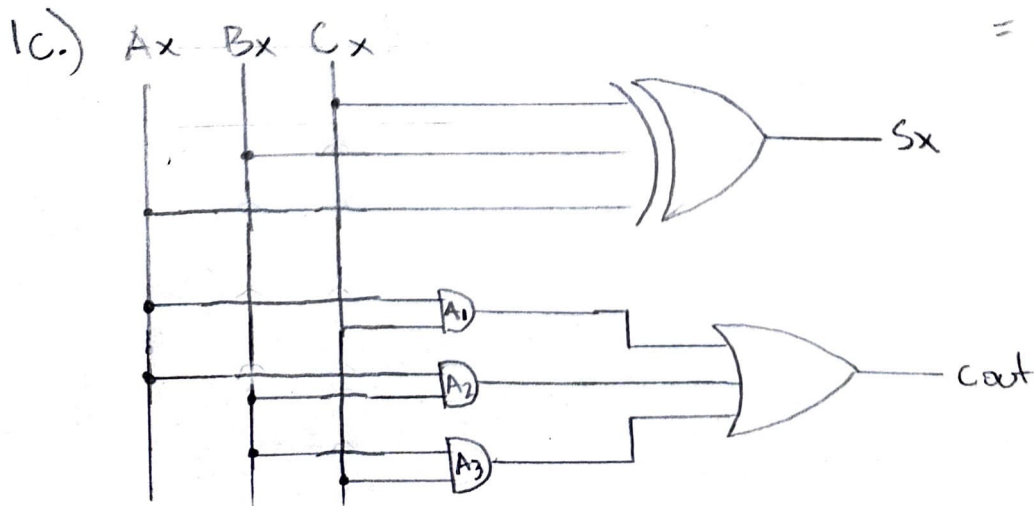
S	X	Y	r
0	0	0	0	R₁
0	0	1	1
0	1	0	0
0	1	1	1
1	0	0	0
1	0	1	0
1	1	0	1
1	1	1	1	R₈

2b.)

$$r = \bar{S}\bar{x}y + \bar{S}xy + Sx\bar{y} + Sxy$$

$$r = \bar{S}y + Sx$$

2c.)