Q1.

1.
```
  1 1 2 1 1
  FB39C
+ 065B9
-------
  01955
```
no overflow

2.
```
  1 0 1 1
  DB84A
+ FF3C7
-------
  DAC11
```
no overflow.

3.
```
  1 1 1 1
  A747F
+ FEB9A
-------
  A6019
```
no overflow.

4.
```
  1 0 1 1
  BC3A7
+ FB169
-------
  B7510
```
no overflow

Q2 1. 11101 - 11010100

$$\begin{array}{r} \ 1 \\ \ 11111101 \\ +\ 00101011 \\ \hline 00101001 \end{array}$$

no overflow

2. 00101 - 10010100

$$\begin{array}{r} \ 1 \\ \ 00101 \\ +\ 01101011 \\ \hline 01110001 \end{array}$$

no overflow

3. 01101 - 11110100

$$\begin{array}{r} \ 1 \\ \ 00001101 \\ +\ 00010011 \\ \hline 00011001 \end{array}$$

no overflow

4. 10001 - 01011101

$$\begin{array}{r} \ 1 \\ \ 11110001 \\ +\ 10100010 \\ \hline 100010011 \end{array}$$

no overflow

Q3.

1° $F = ac' + a'b + b'c$

Answer: 0, 1, 1, 1, 1, 1, 1, 0

2° $F = ab'c + a'bc + b'c$

Answer: 0, 1, 0, 1, 0, 1, 0, 0

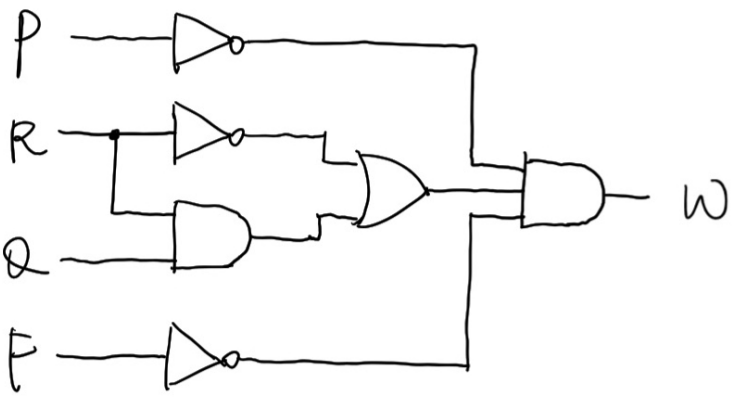
Q4.

(Answer on paper) Design a circuit for a library that turns on a green light by making the control signal W=1, when the number of people in the library is below 20% of its capacity (represented as P=0), and no visitor who entered the library has recently been to a high risk area (represented as R=0) or there are visitors who have recently been to high risk areas (represented as R=1) but has completed the 14-day quarantine (represented as Q=1), and no visitor has a low fever (represented as F=0).

1. Give the logic equation of your design.

2. Draw the corresponding logic circuit of your design.

$$W = P' \cdot (R' + RQ) \cdot F'$$

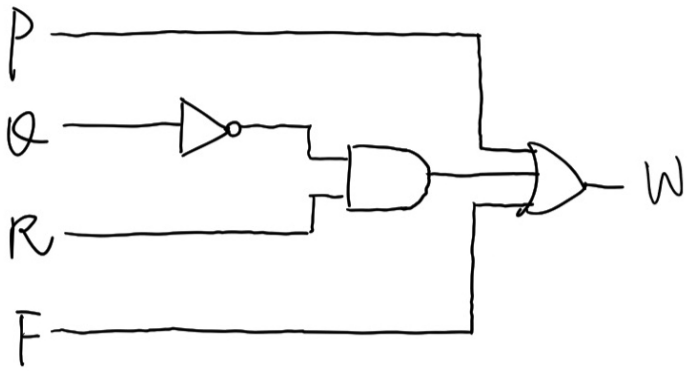


(Answer on paper) Design a circuit for a library that turns on a warning light by making the control signal W=1, when the number of people in the library is over 20% of its capacity (represented as P=1), or a visitor who is entering the library has recently been to a high risk area (represented as R=1) and has not completed the 14-day quarantine (represented as Q=0), or a visitor has a low fever (represented as F=1).

1. Give the logic equation of your design.

2. Draw the corresponding logic circuit of your design.

$$W = P + RQ' + F$$



Q5.

$E7C = -388_{10} = 1110\ 0111\ 1100_2$

$= 7174_8$

$FE3 = -29_{10} = 1111\ 1110\ 0011_2$

$= 7743_8$

$F6B = -149_{10} = 1111\ 0110\ 1011_2$

$= 7553_8$

$EAE = -338_{10} = 1110\ 1010\ 1110_2$

$= 7256_8$

* You can leave only one "1" in the beginning of binary representation

Q6 $79.79 - 01001111.110_2$

$= 4F.C_{16}$

$73.49 = 01001011.011_2$

$= 4B.7_{16}$

$87.62 = 01010111\_100_2$

$= 57.9_{16}$

* first digit "0" of binary representation can be omitted.