Assignment - 2
Solution

1. Simplify:

a. (P + Q + R)(P + Q')(P' + R)

= (PP + PQ' + PQ + QQ' + PR + Q'R)(P' + R)

= (P + P(Q' + Q) + PR + Q'R)(P' + R)

= (P(1 + R) + Q'R)(P' + R)

= (P + Q'R)(P' + R)

= PP' + PR + Q'RP' + Q'RR

= PR + Q'R (P' + 1)

= PR + Q'R

b. A'B'C + (A+B+C)' + A'B'C'

= A'B'C + A'B'C' + A'B'C'

= A'B'C + A'B'C'

= A'B'(C + C')

= A'B'(1) = A'B'

2. Complement:

a. A' + C(B + C')(A' + B')(A + C')

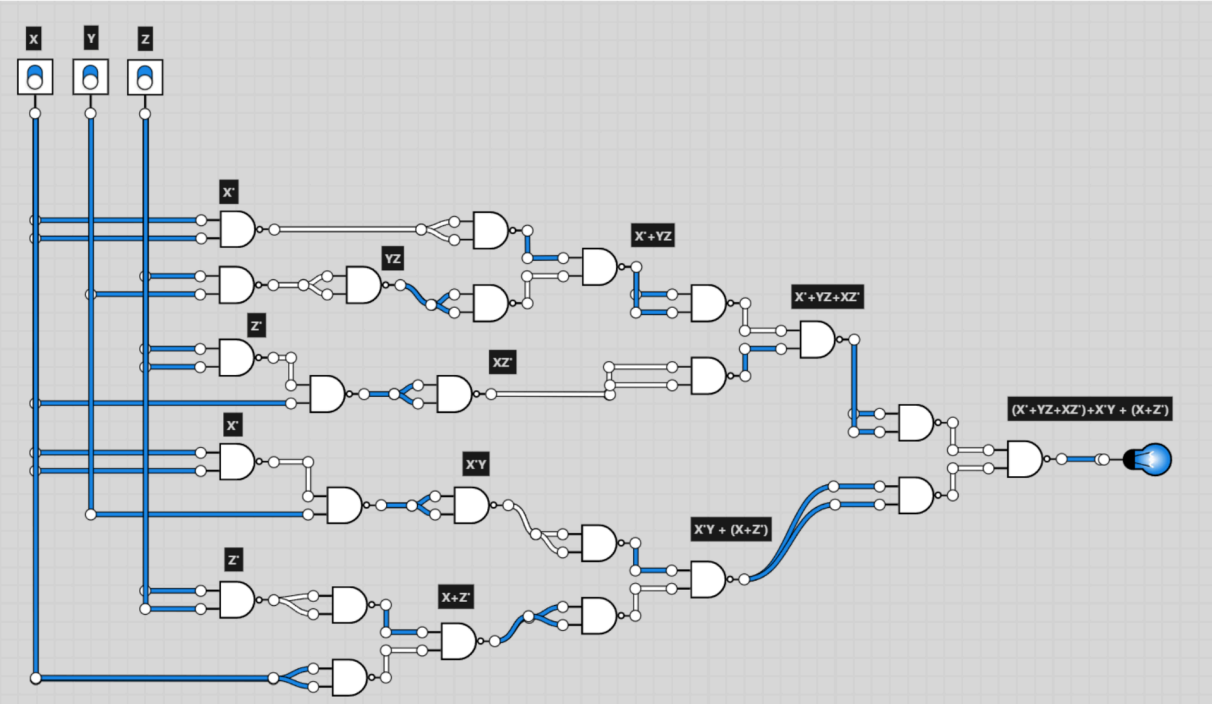
= A' · [C + (B . C') + (A' . B') + (A . C')]

= A [C' + (B'C) + (A B) + (A'C)]

3. POS: F = Π(000, 010, 111)

= (A + B + C)(A + B' + C)(A' + B' + C')

4. Draw using **NAND gates only:**



5. Find SOP and POS:

SOP:

F (P, Q, R, S) = P + QR'S

= P(Q+Q')(R+R')(S+S') + (P+P')QR'S

= (PQ + PQ')(R+R')(S+S') + PQR'S + P'QR'S

= (PQR + PQR' + PQ'R + PQ'R')(S+S') + PQR'S + P'QR'S

= PQRS + PQR'S + PQ'RS + PQ'R'S + PQRS' + PQR'S' + PQ'RS' + PQ'R'S' + PQR'S + P'QR'S

= PQRS + PQR'S + PQ'RS + PQ'R'S + PQRS' + PQR'S' + PQ'RS' + PQ'R'S' + P'QR'S

= ∑ (1111, 1101, 1011, 1001, 1110, 1100, 1010, 1000, 0101)

= ∑ (15, 13, 11, 9,14,12, 10, 8, 5)

= ∑ (5, 8, 9, 10, 11, 12, 13, 14, 15)