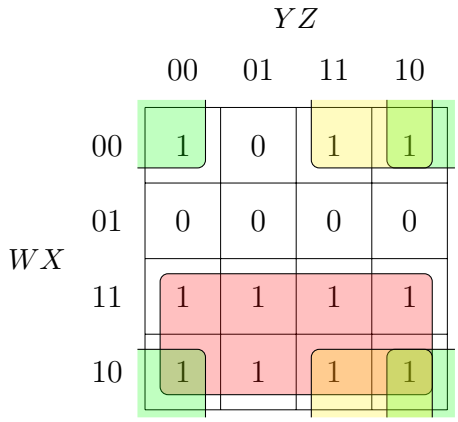
Assignment 1

Problem 1 : Design Combinational Circuit

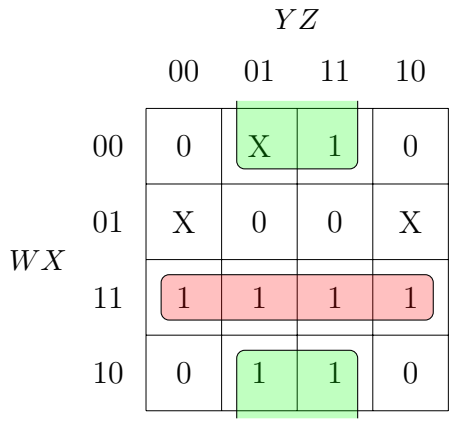
Simplify the following functions using Karnaugh Maps, draw the circuit.

1. $F(W, X, Y, Z) = \sum m(0, 2, 3, 8, 9, 10, 11, 12, 13, 14, 15)$



$\Rightarrow F = W + X'Z' + X'Y$

2. $F(W, X, Y, Z) = \sum m(3, 9, 11, 12, 13, 14, 15) + \sum d(1, 4, 6)$



$\Rightarrow F = WX + X'Z$

3. $F(A, B, C, D) = AC'D' + A'C + ABC + AB'C + A'C'D'$

$$
\begin{aligned}
F &= AC'D' + A'C + ABC + AB'C + A'C'D' \\
&= A(C' + D') + A'C + ABC + AB'C + A'C'D' \\
&= A(C' + D') + A'C + ABC + AB'C + A' + C' + D' \\
&= A(C' + D') + ABC + AB'C + A' + C' + D' \\
&= C' + D' + ABC + AB'C + A' + C' + D' \\
&= C' + D' + ABC + AB'C + A' + D' \\
&= C' + D' + ABC + AB'C + A' \\
&= C' + D' + AC(B + B') + A' \\
&= C' + D' + AC1 + A' \\
&= C' + D' + AC + A' \\
&= C' + D' + A + A' \\
&= C' + D' + 1 \\
&= 1
\end{aligned}
$$

4. $F(A, B, C, D) = A'B'C'D + CD + AC'D$

$$
\begin{aligned}
F &= A'B'C'D + CD + AC'D \\
&= (A' + B' + C')D + CD + AC'D \\
&= (A' + B' + C')D + D(C + AC') \\
&= DA' + DB' + DC' + D(A + C) \\
&= DA' + DB' + DC' + DA + DC \\
&= D(A + A') + DB' + DC' + DC \\
&= D1 + DB' + DC' + DC \\
&= D + DB' + DC' + DC \\
&= D + DC' + DC \\
&= D + DC \\
&= D
\end{aligned}
$$

Promblem 2 : Design Sequential Circuit

Current State (S)	Next State (S')		Output (Z)
	X=0	X=1	
A	F	B	0
B	A	F	1
C	A	D	1
D	F	E	0
E	D	B	1
F	D	E	0

For the given state table, design the circuit for FSM using JK Flip-Flop.