1. convert 892.035 into octal

$$\begin{array}{r|l} 8 & 892 \\ \hline 8 & 111 - 4 \\ \hline 8 & 13 - 7 \\ \hline & 1 - 5 \end{array}$$

$0.035 \times 8 = 0.28$	0
$0.28 \times 8 = 2.24$	2
$0.24 \times 8 = 1.92$	1
$0.92 \times 8 = 7.36$	7

$(892.035)_{10} = (1574.0217)_8$

2. convert A092 into binary

10 0 9 2

1010 0000 1001 0010

$(A092)_{16} = (1010000010010010)_2$

3. Find 15's complement of F9E7

15	15	15	15
15	9	14	7
0	6	1	8

15's complement of F9E7 = $(0618)_{16}$

4. Find 6's complement of $(362)_7$

6	6	6
3	6	2
3	0	4

6's complement of $(362)_7 = (304)_7$

5. Subtract 25 and 37 using 2's complement

A : 25 ⇒ 010101

B : 37 ⇒ 100111 ⇒ 011000 (1's)

$$\begin{array}{r} 011000 \\ 1 \\ \hline 011001 \end{array}$$ (2's)

$$\begin{array}{r} 010101 \\ 011001 \\ \hline 101110 \end{array} \Rightarrow \begin{array}{r} 010001 \text{ (1's)} \\ 1 \\ \hline 010010 \end{array} \Rightarrow -22$$

$25 - 37 = -22$

6. Represent the following in POS and SOP form

$Y = y + xz'$ $\qquad Z = (x+y').z.(y+z)$

$Y = y(x+x')(z+z') + xz'(y+y')$

$Y = yx + yx'(z+z') + xyz' + xy'z'$

$Y = xyz + xyz' + x'yz + x'yz' + xyz' + xy'z'$

$Y = xyz + xyz' + x'yz + x'yz' + xy'z'$

$Y = \Sigma(2,3,4,6,7)$

$Y = \Pi(0,1,5)$

$Z = (xz + xy'z)(y+z)$

$Z = xyz + xz + y'z$

$Z = xyz + xz(y+y') + y'z(x+x')$

$Z = xyz + xyz + xy'z + xy'z + x'y'z$

$Z = xyz + xy'z + x'y'z$

$Z = \Sigma(1,5,7)$

$Z = \Pi(0,2,3,4,6)$

7. Simplify the following Boolean expressions in algebraic form

$M = abc + abc' + ab'c + a + bc' + a'b$

$$M = ab(c+c') + ab'c + a + bc' + a'b$$

$$M = ab + ab'c + a + bc' + a'b$$

$$M = a(b+1) + ab'c + bc' + a'b$$

$$M = a + ab'c + bc' + a'b$$

$$M = a(1+b'c) + bc' + a'b$$

$$M = a + bc' + a'b$$

$$M = a + b + bc'$$

$$M = a + b(1+c')$$

$$M = a + b$$

$N = (a+d)(c'+a)(a'+b)$

$$N = (ac' + a + c'd + ad)(a'+b)$$

$$N = (a(c'+1) + c'd + ad)(a'+b)$$

$$N = (a + c'd + ad)(a'+b)$$

$$N = (a(1+d) + c'd)(a'+b)$$

$$N = (a + c'd)(a+b)$$

$$N = ab + a'c'd + bc'd$$

9. Find dual and complement of $F = xy + z'w$

dual of $F = (x+y)(z'+w)$

$$F' = \overline{xy + z'w}$$

$$= (xy)' \cdot (z'w)'$$

$$F' = (x'+y')(z+w')$$

10. Represent the complement of the following Boolean expression in sum of min terms and product of maxterms form: $y'z' + x'$

$$F = y'z' + x'$$

$$F' = \overline{y'z' + x'}$$

$$= (y'z')' \cdot (x')'$$

$$F' = (y+z)(x)$$

$$F' = xy + xz$$

$$= xy(z+z') + xz(y+y')$$

$$F' = xyz + xyz' + xyz + xy'z$$

$$F' = xyz + xyz' + xy'z$$

$$F' = \Sigma(5,6,7)$$

$$F' = \Pi(0,1,2,3,4)$$

$$F' = (x'+y'+z')(x'+y'+z)(x'+y+z')(x'+y+z)(x+y'+z')$$

8. Simplify using K-map

i) $F = \Pi(0,2,3)$ and $d = \Pi(1)$

A \ B	$\bar{B}$	B
$\bar{A}$	0_{0}	X_{1}
A	0_{2}	0_{3}

F =

ii) $Y = \Pi(1,3,4,5,7)$ $\quad Y = \Sigma(0,2,6)$

A \ BC	$\bar{B}\bar{C}$	$\bar{B}C$	BC	$B\bar{C}$
$\bar{A}$	1_{0}	$_{1}$	$_{3}$	1_{2}
A	$_{4}$	$_{5}$	$_{7}$	1_{6}

$$Y = \bar{A}\bar{C} + B\bar{C}$$

$$Y = \bar{C}(\bar{A}+B)$$

iii) $Y = \Pi(0,1,5,7,9,10,14,15)$, $d = \Pi(2,8)$

$Y = \Sigma(\cancel{2},3,4,6,\cancel{8},11,12,13)$ $d = \Pi(2,8)$

AB \ CD	$\bar{C}\bar{D}$	$\bar{C}D$	CD	$C\bar{D}$
$\bar{A}\bar{B}$	0	1	1 (3)	X (2)
$\bar{A}B$	1 (4)	5	7	1 (6)
AB	1 (12)	1 (13)	15	14
$A\bar{B}$	X (8)	9	1 (11)	10

$Y = \bar{B}CD + \bar{A}C\bar{D} + B\bar{C}\bar{D} + AB\bar{C}$

iv) $M = \Sigma(1,3)$

A \ B	$\bar{B}$	B
$\bar{A}$	0	1 (1)
A	2	1 (3)

$M = B$

v) $N = \Sigma(0,2,3,7)$

A \ BC	$\bar{B}\bar{C}$	$\bar{B}C$	BC	$B\bar{C}$
$\bar{A}$	1 (0)	1	1 (3)	1 (2)
A	4	5	1 (7)	6

$N = \bar{A}\bar{C} + BC$

vi) $T = \Sigma(0,2,3,5,9,10,12,13,15)$ $d = \Sigma(7,8)$

AB \ CD	$\bar{C}\bar{D}$	$\bar{C}D$	CD	$C\bar{D}$
$\bar{A}\bar{B}$	1 (0)	1	1 (3)	1 (2)
$\bar{A}B$	4	1 (5)	X (7)	6
AB	1 (12)	1 (13)	1 (15)	14
$A\bar{B}$	X (8)	1 (9)	11	1 (10)

$T = \bar{D}\bar{B} + BD + A\bar{C} + \bar{A}\bar{B}C$