HOMEWORK #3 SOLUTIONS/RUBRIC:

PROBLEM #1:

a) $\overline{AB}\ \overline{ABC}\ \overline{ABCD}(A+B)$

$= \overline{AB}(1+\bar{C}+\overline{CD})(A+B)$

$= \overline{AB}(A+B)$

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

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

$= \underline{\bar{B}A + \bar{A}B \text{ or } A \oplus B}$ (+1)

b) $\bar{X}+Z(XZ+XY+YZ)+\overline{\bar{X}(\bar{Y}+\bar{Z})}$

$= \bar{X}+XZZ+XYZ+YZZ+X+YZ$

$= \bar{X}+X+XZZ+XYZ+YZZ+YZ$

$= 1+XZZ+XYZ+YZZ+YZ$

$= \underline{1}$ (+1)

c) $(B+C)(\bar{B}+C)+\overline{\bar{A}+\bar{B}+\bar{C}}$

$= B\bar{B}+BC+C\bar{B}+CC+ABC$

$= 0+BC+C\bar{B}+C+ABC$

$= C(B+\bar{B}+ABC)$

$= C(1+1+ABC)$

$= \underline{C}$ (+1)

d) $X(\bar{X}+Z)(\bar{X}Y+Z)(\bar{X}YZ+\bar{Z})$

$= (\cancel{X\bar{X}}+XZ)(\bar{X}Y+Z)(\bar{X}YZ+\bar{Z})$

$= (XZ)(\bar{X}Y+Z)(\bar{X}YZ+\bar{Z})$

$= (X\cancel{\bar{X}}YZ+XZZ)(\bar{X}YZ+\bar{Z})$

$= (XZZ)(\bar{X}YZ+\bar{Z})$

$= \underline{0}$ (+1)

PROBLEM #2:

a) $F = \bar{A}(BC + D)$ (+1)

A	B	C	D	F
0	0	0	0	0
0	0	0	1	1
0	0	1	0	0
0	0	1	1	1
0	1	0	0	0
0	1	0	1	1
0	1	1	0	1
0	1	1	1	1
1	0	0	0	0
1	0	0	1	0
1	0	1	0	0
1	0	1	1	0
1	1	0	0	0
1	1	0	1	0
1	1	1	0	0
1	1	1	1	0

b) $F = \bar{A}(BC + D)$

$\overline{(\bar{A}BC + \bar{A}D)} = (A + \bar{B} + \bar{C})(A + \bar{D})$

$= AA + A\bar{D} + \bar{B}A + \bar{B}\bar{D} + \bar{C}A + \bar{C}\bar{D}$

$= A(1 + \bar{D} + \bar{B} + \bar{C}) + \bar{D}(\bar{B} + \bar{C})$

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

$\bar{F} = A + \bar{D}\bar{B} + \bar{D}\bar{C}$ (+1)

PROBLEM #3:

a) $(\overline{\bar{A} + \bar{B}}) + \overline{(A + C) \cdot (B + \bar{C})}$ (+1)

b) $AB + \overline{(AB + A\bar{C} + CB + C\bar{C})}$

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

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

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

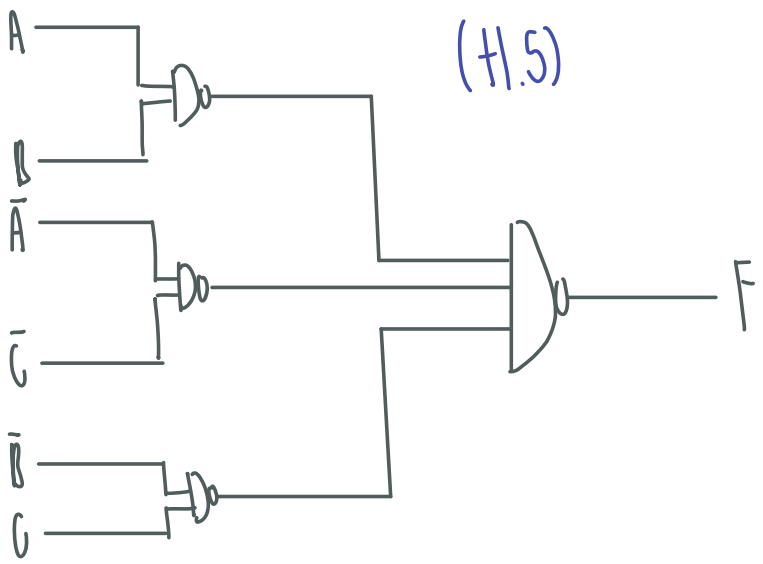
$= AB + (\bar{A}\bar{C} + \bar{A}B + \bar{B}C)$

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

$= \overline{\overline{AB + \bar{A}\bar{C} + \bar{B}C}}$

$= \overline{(\overline{AB}) \cdot (\overline{\bar{A}\bar{C}}) \cdot (\overline{\bar{B}C})}$ (+1.5)

c)



(+1.5)