Steven Tang

1. $\overline{103}$

0110 0111 is the 2s Complement of 103. Unsigned would be the same because we'd ignore the one in the front, if any

$\boxed{\text{Ans: } 103}$

2. 0001 1010

$= 2^4 + 2^3 + 2^2$

$\boxed{= (26)_{10}}$

3. $(\bar{x}) + (xy) + (x\bar{z}) + (x\bar{y}\bar{z})$

$\cancel{(\bar{x}+x)}(\bar{x}+y) + x\bar{z}\cancel{(1+\bar{y})}$

$= (\bar{x}+y) + (x\bar{z})$

$= (\bar{x}+x\bar{z}) + y$

$\boxed{= \bar{x}+\bar{z}+y}$

4. $\overline{(x+y)}(\bar{x}+\bar{y})$

$= (\bar{x}\,\bar{y})(\bar{x}+\bar{y})$

$= (\bar{x}\bar{x}\bar{y}) + (\bar{x}\bar{y}\bar{y})$

$(\bar{x}\bar{y}) + (\bar{x}\bar{y})$

$= \boxed{\bar{x}\bar{y}}$

5. $x(x+y+z)(x'+y)(x+q)(x+q'+z)$

$= (x+yx+zx)(x'+y)(x+qx+qq+qz)$

$= x(y+z)(x+y)(x+\bar{q}x+qz)$

$= x(y+z)(\bar{x}+y)\ x(q)+qz$

$xy(y+z)(xq)+(qz)$

$= xy(y+z)q(x+z)$

$= (xyy+xyz)q(x+z)$

$= (x+xyz)q(x+z)$

$(xyz)q(x+z)$

$\boxed{= (xy)}$

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6. ~~$x(x+y+z)(\bar{x}+y)(x+q$~~

$= x(x+y+\bar{z})(\bar{x}+z)(y+\bar{z})(x+z)$

$= x(x+y+z)(y+\bar{z})z$

$= x(x+y+z)zy$

$= (xx+xy+zx)zy$

$= (x+xy+zx)zy$

$x(y+z)zy$

$= \boxed{xy}$

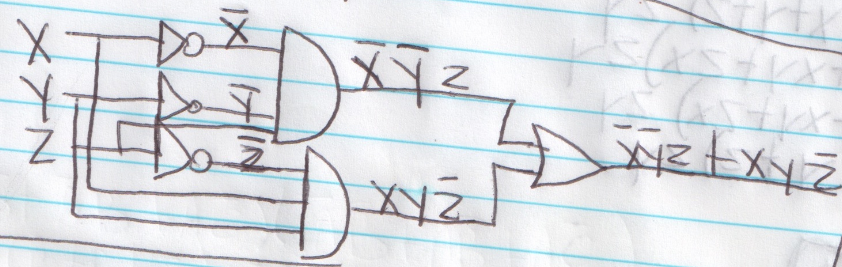
7.

X	Y	Z	F
0	0	1	1
1	1	0	1

$F = \bar{X}\bar{Y}Z$

$F = XY\bar{Z}$

$= \bar{X}\bar{Y}Z + XY\bar{Z}$



8. $xyz(xy\bar{z} + z\bar{y}z + \bar{x}yz)$

$xxyyz\bar{z} + xy\bar{y}zzz + x\bar{x}yyzz$

$x\,y(0)(0)xz + yz(0))$

$\boxed{0}$ False

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9. $xy + \overline{x}\,\overline{y}$

$= \overline{x}x + xy + \overline{x}x + \overline{y}x$

$= (xy + \overline{x}) + \overline{y}x$

$= \overline{x} + y + x + \overline{y}$

$\Downarrow$

$\boxed{= (\overline{x}+y)(x+\overline{y})}$

10. $(A\overline{B} + \overline{A}B + A\overline{C})(\overline{A}\,\overline{B} + A\overline{B} + A\overline{C})$

$= A(\overline{B}+B+\overline{C})(\overline{A}\,\overline{B}) + A(\overline{B}\,\overline{C})$

$= A(\overline{C})(\overline{A}\,\overline{B}) + (\overline{B}\,\overline{C})$

$= (A\overline{C})(\overline{A}\,\overline{B}) + (\overline{B}\,\overline{C})$

$= A(\overline{B}\,\overline{C}) + (\overline{B}\,\overline{C})$

$\boxed{= A + \overline{B}\,\overline{C}}$

None of the above

11.

x	y	z	F	
1	0	0	1	$x\overline{y}\,\overline{z}$
1	1	0	1	$xy\overline{z}$
0	1	0	1	$\overline{x}y\overline{z}$
1	1	1	1	xyz

$= (x\overline{y}\,\overline{z} + xy\overline{z} + \overline{x}y\overline{z} + xyz)$

$= x\overline{y}\,\overline{z} + \overline{x}y\overline{z} + xy$

$= xy + x\overline{z} + y\overline{z}$

None of the above

12. Σ 0, 2, 4, 8, 9, 10, 11, 12, 13

wxyz

w	x	y	z	F
0	0	0	0	1
0	0	0	1	0
0	0	1	0	1
0	0	1	1	0
0	1	0	0	1
0	1	0	1	0
0	1	1	0	0
0	1	1	1	0
1	0	0	0	1
1	0	0	1	1
1	0	1	0	1
1	0	1	1	1
1	1	0	0	1
1	1	0	1	1
0	1	1	0	0
0	1	1	1	0

wx \ yz	00	01	11	10
00	1	0	0	1
01	1	0	0	0
11	1	1	0	0
10	1	1	1	1

$\boxed{= \bar{w}\bar{x}\bar{z} + \bar{y}\bar{z} + w\bar{x} + wx\bar{y}}$