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CE100 HW#1 Pg 1/3 TuTh 1:30

1) $(x_1 + x_2) \cdot (x_3 + (x_4 \cdot x_6) + (x_5 \cdot \cancel{x}_6))$

2) a) $xy + \bar{w}x + \bar{w}\bar{y} = xyw + \bar{w}$

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

$$xy + \bar{w} \quad \bar{xy}$$

$$\bar{w} + xy$$

$$xyw + \bar{w} = xyw + \bar{w}$$

b) $(\bar{a} + \bar{b})(\bar{a} + c) = \bar{a}\bar{b} + a\bar{b}c$

$$\bar{a}\bar{a} + \bar{a}c + \bar{a}b + \bar{b}c$$

$$\bar{a} + \bar{a}c + \bar{a}b + \bar{b}c$$

$$\bar{a} + \bar{a}b + \bar{b}c$$

$$\bar{a} + \bar{b}c$$

$$\bar{a} + a\bar{b}c = \bar{a} + a\bar{b}c$$

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

$$xxx + x\bar{y} + x\bar{z} + xy + yx + y\bar{z} + xz + yz + \bar{y}\bar{z} + \emptyset$$

$$x + xy + y + x\bar{z} + xz + yz + \bar{y}\bar{z}$$

x + y part lets us take away
anything w/ xor y

$$x + y = x + y$$

$$2(\text{cont}) \quad d) \quad (a+c)(\bar{a}+\bar{b})(\bar{b}+c) = (a+c+b)\bar{b}$$

$$(a+c)(\bar{b}+\bar{a}\bar{c})$$

$$a\bar{b} + \bar{b}c$$

$$\bar{b}(a+c)$$

$$\boxed{(a+c+b)\bar{b} = (a+c+b)\bar{b}}$$

$$e) \bar{x}\bar{y} + \bar{y}z + xz = \bar{x}\bar{y} + xz$$

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

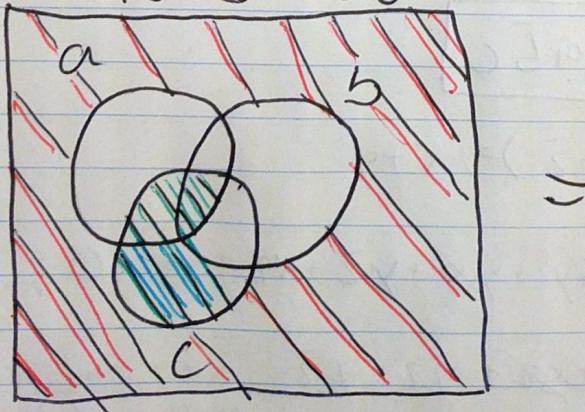
$$\bar{x}\bar{y} + \bar{x}\bar{y}z + x\bar{y}z + xz$$

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

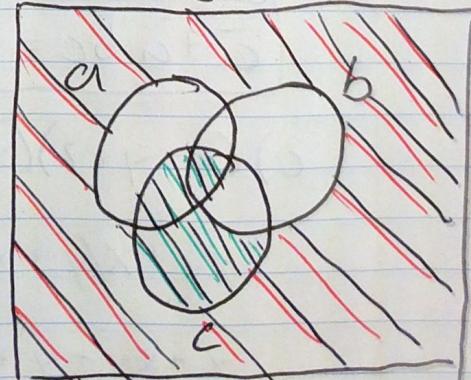
$$\boxed{\bar{x}\bar{y} + xz = \bar{x}\bar{y}xz}$$

$$3) \bar{a}\bar{b} + \bar{b}c + ac = \bar{a}\bar{b} + ac$$

$$\bar{a}\bar{b} + \bar{b}c + ac$$



$$\bar{a}\bar{b} + ac$$



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$$4) (\bar{d} + \bar{e} + f + g)(\bar{d} + \bar{e} + \bar{f}\bar{g}) = \bar{de}$$

defg	$\bar{d} + \bar{e} + f + g$	$\bar{d} + \bar{e} + \bar{f}\bar{g}$	$(\bar{d} + \bar{e} + f + g)(\bar{d} + \bar{e} + \bar{f}\bar{g})$	\bar{de}
0000	1	1	1	1
0001	1	1	1	1
0010	1	1	1	1
0011	1	1	1	1
0100	1	1	1	1
0101	1	1	1	1
0110	1	1	1	1
0111	1	1	1	1
1000	1	1	1	1
1001	1	1	1	1
1010	1	1	1	1
1011	1	1	1	1
1100	0	1	0	0
1101	1	0	0	0
1110	1	0	0	0
1111	1	0	0	0

these two
col are equal
thus

$$(\bar{d} + \bar{e} + f + g)(\bar{d} + \bar{e} + \bar{f}\bar{g}) = \bar{de}$$

$$5) a) \overline{\bar{a} b + \bar{c}} = \boxed{(\bar{a} + b') c}$$

$$b) \overline{(d+e)f\bar{f}e}$$

$$(d+e) + (f + \bar{e}) \quad \text{continued on next page}$$

$$5 \text{ cont}) b \text{ cont}) \bar{d}\bar{e} + \bar{\bar{f}} + \bar{e}$$

$$\bar{d}\bar{e} + f + \bar{e}$$

$$\boxed{f + \bar{e}}$$

$$c) \overline{xz + (z + \bar{y})(x + yz)}$$

$$\overline{xz} \left(\overline{(z + \bar{y})} + \overline{(x + yz)} \right)$$

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

$$\overline{xn}(x + \bar{z})(\bar{z}y + x + yz)$$

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

$$xz + xy + xx + z\bar{z} + y\bar{z} + x\bar{z}$$

$$xz + xy + x + y\bar{z} + x\bar{z}$$

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

xyz	f
000	0
001	0
010	1
011	1
100	1
101	0
110	1
111	0

$$\boxed{f \quad f \quad f \quad m(2, 3, 4, 6)}$$

$$\boxed{f(x_1, y_1, z) = m(2, 3, 4, 6)}$$

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6 (cont) b) $f(x, y, z) = \bar{x}y\bar{z} + \bar{x}yz + x\bar{y}\bar{z} + xy\bar{z}$

c) $\bar{x}y\bar{z} + \bar{x}yz + x\bar{y}\bar{z} + xy\bar{z}$

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

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

d) $f(x, y, z) = \overline{TM}(0, 1, 5, 7)$

e)

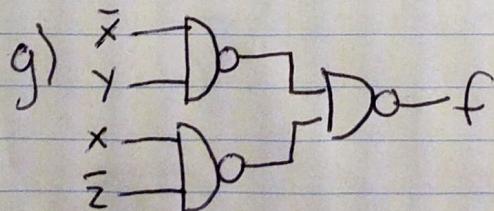
$$f(x, y, z) = (\bar{x} + \bar{y} + \bar{z})(x + \bar{y} + z)(x + y + \bar{z})(x + y + z)$$

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

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

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

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



6 (cont) h)

