Honest Effort

5.1.2 d) $\overline{x\bar{y} + y\bar{z} + \bar{x}z}$

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

$= (\overline{x\bar{y}})\,\overline{y\bar{z}}\;\overline{\bar{x}z}$

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

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

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

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

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

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

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

$x\bar{x} + y\bar{z}\bar{x} + xy + y\bar{z}y + x\bar{z} + y\bar{z}z$	Distributive law
$0 + y\bar{z}\bar{x} + xy + y\bar{z}y + x\bar{z} + y\bar{z}z$	complement law
$0 + y\bar{z}\bar{x} + xy + yy\bar{z} + x\bar{z} + y\bar{z}z$	commutative law
$0 + y\bar{z}\bar{x} + xy + y\bar{z} + x\bar{z} + y\bar{z}\bar{z}$	Idempotent law
$0 + y\bar{z}\bar{x} + xy + y\bar{z} + x\bar{z} + y\bar{z}$	Idempotent law
$y\bar{z}\bar{x} + xy + y\bar{z} + x\bar{z} + y\bar{z}$	Identity law
$y\bar{z}\bar{x} + xy + x\bar{z} + y\bar{z} + y\bar{z}$	commutative law
$y\bar{z}\bar{x} + xy + x\bar{z} + y\bar{z}$	Idempotent law

5.4.1 b) Multiplication and complement

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

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

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

Addition and complement

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

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

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

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

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

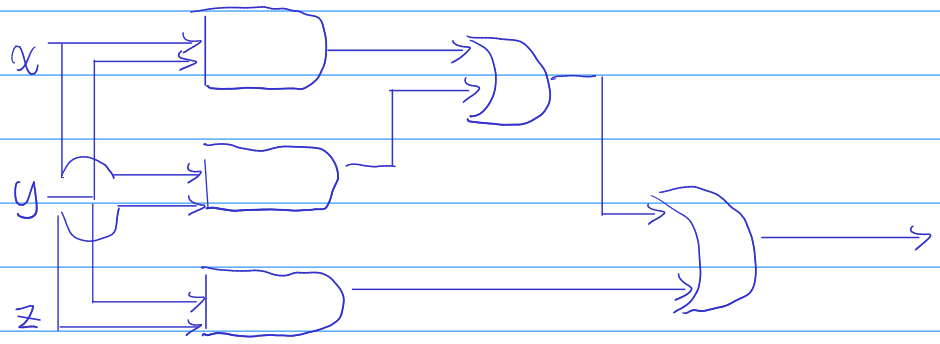
when $x=1, y=0, z=0$ make the expression satisfiable.

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

x	y	z		
1	1	1	0	$x+y$
1	1	0	0	$x+y$
1	0	1	0	$\bar{y}+z$
1	0	0	0	$x+\bar{y}+\bar{z}$
0	1	1	0	$\bar{x}+y+z$
0	1	0	0	$\bar{x}+\bar{z}$
0	0	1	0	$\bar{y}+z$
0	0	0	0	$\bar{x}+\bar{z}$

∴ It is not satisfiable.

5.6.4 b) The output is 1 if at least two of the three inputs is 1.



Honest Effort and Feedback

5.4.5 a) we know that $x \to y$ is equivalent to $\bar{x} + y$,
and { addition, complement } is functionally complete,
∴ { $\to$, complement } is also functionally complete.

5.5.5 a) $x_{A1} + x_{A2} + x_{A3}$

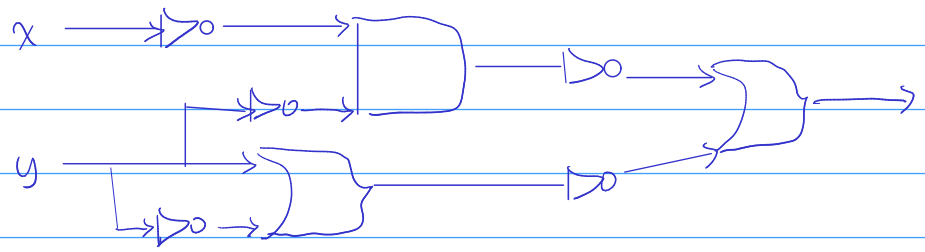
b) $(x_{A1} + x_{A2})(\overline{x_{A1} x_{A2}})(x_{A1} + x_{A3})(\overline{x_{A1} x_{A3}})(x_{A2} + x_{A3})(\overline{x_{A2} x_{A3}})$

c) $(\overline{x_{A1} x_{B1}})(\overline{x_{A2} x_{B2}})(\overline{x_{A3} x_{B3}})$

d) n classes
m pair of classes

$2n + 2m$

5.6.3 d)



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

$\overline{\bar{x}\,\bar{y}} + (\overline{y + \bar{y}})$	Start
$\bar{\bar{x}} + \bar{\bar{y}} + (\overline{y + \bar{y}})$	Demorgan's law
$x + \bar{\bar{y}} + (\overline{y + \bar{y}})$	Double negation law
$x + y + (\overline{y + \bar{y}})$	Double negation law
$x + y + (\bar{y}\bar{\bar{y}})$	Demorgan's law
$x + y + (\bar{y}y)$	Double negation law
$x + y + (y\bar{y})$	Commutative law
$x + y + 0$	complement law
$x + y$	Identity law