3.8 $F = AB \oplus [(A \equiv D) + D]$

$= AB \oplus (AD + A'D' + D)$

$= AB \oplus (A'D' + D)$

$= AB \oplus (A' + D)$

$= (AB)(A'+D)' + (AB)'(A'+D)$

$= (AB)(AD') + (A'+B')(A'+D)$

$= ABD' + A' + B'D$

$= A' + BD' + B'D$

3.16 (a) $(X+W)(Y \oplus Z) + XW'$

$= (X+W)(YZ' + Y'Z) + XW'$

$= XYZ' + XY'Z + \underline{WYZ'} + WY'Z + \underline{XW'}$

$= XY'Z + WYZ' + \underline{WY'Z} + \underline{XW'}$

$= WYZ' + WY'Z + XW'$

(b) $(A \oplus BC) + BD + ACD$

$= A'BC + A(BC)' + BD + ACD$

$= A'BC + \underline{AB'} + AC' + \underline{BD} + ACD$

$= A'BC + AB' + AC' + BD + ACD + AD$

$= A'BC + \underline{AB'} + AC' + \underline{BD} + AD$

$= A'BC + AB' + AC' + BD$

3.10 (c) $(A'+C'+D')\underline{(A'+B+C')}\,\underline{(A+B+D)}(A+C+D)$

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

$= (A'+C'+D') \quad (A+B+D)\underline{(A+C+D)}\,\underline{(B+C'+D)}$

$= (A'+C'+D') \quad (A+C+D)(B+C'+D)$

3.18

(a) $x \oplus 0 = x(0)' + x'(0) = x$

(b) $x \oplus 1 = x(1)' + x'(1) = x'$

(c) $x \oplus x = x(x)' + x'(x) = 0$

(d) $x \oplus x' = x(x')' + x'(x') = x + x' = 1$

(e) $x \oplus y = x(y)' + x'(y) = y(x)' + y'(x) = y \oplus x$

(f) $(x \oplus y) \oplus z = (xy' + x'y) \oplus z$

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

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

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

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

$= x \oplus (yz' + y'z) = x \oplus (y \oplus z)$

(g) $(x \oplus y)' = (xy' + x'y)'$

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

$= xy + x'y'$

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

$= x \oplus y'$

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

$= y \oplus x'$

3.29

$$SUM = (X \oplus Y) \oplus C_i$$
$$= (XY' + X'Y) \oplus C_i$$
$$= (XY' + X'Y)C_i' + (XY' + X'Y)'C_i$$
$$= XY'C_i' + X'YC_i' + XYC_i + X'Y'C_i$$

$$C_o = (X \oplus Y)C_i + XY$$
$$= \underline{XY'C_i} + X'YC_i + \underline{XY}$$
$$= XC_i + \underline{X'YC_i} + \underline{XY}$$
$$= XC_i + YC_i + XY$$

X	Y	C_i	SUM	C_o
0	0	0	0	0
0	0	1	1	0
0	1	0	1	0
0	1	1	0	1
1	0	0	1	0
1	0	1	0	1
1	1	0	0	1
1	1	1	1	1

3.30

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

$$F = AB + AC + BC$$

3.36

$$abc' + d'e + ace + b'c'd'$$

$$= (abc' + ace + b'c'd') + d'e$$

$$= (abc' + ace + \underline{b'c'd'} + \underline{d'})(abc' + \underline{ace} + b'c'd' + \underline{e})$$

$$= (abc' + ace + d')(abc' + b'c'd' + e)$$

$$= [a(bc' + ce) + d'][c'(ab + b'd') + e]$$

$$= [a(b+c)(c'+e) + d'][c'(a+b')(b+d') + e]$$

$$= (a+d')(b+c+d')\underline{(c'+e+d')}\,\underline{(c'+e)}(a+b'+e)(b+d'+e)$$

$$= (a+d')\underline{(b+c+d')} \qquad \underline{(c'+e)}(a+b'+e)(b+d'+e)$$

$$= (a+d')(b+c+d') \qquad (c'+e)(a+b'+e)$$

3.38 (a) $x(y+a') = x(y+b')$ is true

$$\Rightarrow [x(y+a')] \oplus [x(y+b')] = 0$$

$$\Rightarrow [x(y+a')][x(y+b')]' + [x(y+a')]'[x(y+b')] = 0$$

$$\Rightarrow x(y+a')(x'+y'b) + (x'+y'a)x(y+b') = 0$$

$$\Rightarrow xy'b(y+a') + xy'a(y+b') = 0$$

$$\Rightarrow xy'ba' + xy'ab' = 0$$

$$\Rightarrow xy'(ba' + ab') = 0$$

$$\Rightarrow xy'(a \oplus b) = 0$$

If $x(y+a') = x(y+b')$, then $xy'(a \oplus b) = 0$.

Consider $x=1$, $y=1$, $a=0$, $b=1$,

$xy'(a\oplus b) = 1 \cdot 1'(0 \oplus 1) = 0$, statement is true with $a \neq b$.

Thus, "If $x(y+a') = x(y+b')$, then $a = b$" is not true.

3.38 (b) $a'b + ab' = a'c + ac'$ is true

$\Rightarrow (a'b+ab') \oplus (a'c+ac') = 0$

$\Rightarrow (a'b+ab')(a'c+ac')' + (a'b+ab')'(a'c+ac') = 0$

$\Rightarrow (a'b+ab')(ac+a'c') + (ab+a'b')(a'c+ac') = 0$

$\Rightarrow a'bc' + ab'c + abc' + a'b'c = 0$

$\Rightarrow a'(bc'+b'c) + a(b'c+bc') = 0$

$\Rightarrow bc'+b'c = 0$

$\Rightarrow b \oplus c = 0$

$\Rightarrow b = c$

Thus, "If $a'b+ab' = a'c+ac'$, then $b=c$" is true.