

1. a)

X	Y	X+Y	X+Y	(X+Y)(X+Y)
0	0	0	1	0
0	1	1	0	0
1	0	1	1	1
1	1	1	1	1

b)

X	Y	X+Y	X(X+Y)
0	0	0	0
0	1	1	0
1	0	1	1
1	1	1	1

c)

X	Y	Y	X+Y	(X+Y)Y
0	0	1	1	0
0	1	0	0	0
1	0	1	1	0
1	1	0	1	1

2. a) $Y = \overline{A}BC + \overline{A}\overline{B}\overline{C} = \overline{A}B(C + \overline{C}) = \overline{A}B$

b) $Y = \overline{A}\overline{B}\overline{C} + \overline{A}\overline{B} = \overline{A} + \overline{B} + \overline{C} + \overline{A}\overline{B} = \overline{A} + \overline{B}(1 + \overline{A}) + \overline{C}$
 $= \overline{A} + \overline{B} + \overline{C}$

c) $Y = ABC\overline{D} + \overline{A}\overline{B}\overline{C}\overline{D} + (\overline{A+B+C+D})$

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

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

$$= \overline{A}\overline{B}\overline{C}\overline{D} + \overline{A}\overline{B}\overline{C}\overline{D}$$

3. a) $f(x, y, z) = \Sigma(0, 1, 2, 3, 7)$

z \ xy	00	01	11	10
0	1	1	0	0
1	1	1	1	0

$$f = \overline{X} + YZ$$

b) $f(x, y, w, z) = \sum (2, 3, 5, 6, 7, 10, 11, 13, 14)$

$wz \backslash xy$	00	01	11	10
00	0	0	0	0
01	0	1	1	0
11	1	1	0	1
10	1	1	1	1

$$f = \bar{x}w + \bar{y}w + w\bar{z}$$

c) $f(x, y, w, z) = \sum (0, 2, 3, 6, 7, 8, 10) + d(14, 15)$

$wz \backslash xy$	00	01	11	10
00	1	0	0	1
01	0	0	0	0
11	1	1	X	0
10	1	1	X	1

$$f = \bar{x}w + \bar{y}\bar{z}$$

4	x_2	x_1	x_0	y_1	y_0
	0	0	0	0	0
	0	0	1	0	1
	0	1	0	0	1
	0	1	1	1	0
	1	0	0	0	1
	1	0	1	1	0
	1	1	0	1	0
	1	1	1	1	1

$$y_0 = \bar{x}_2 \bar{x}_1 x_0 + \bar{x}_2 x_1 \bar{x}_0 + x_2 \bar{x}_1 \bar{x}_0 + x_2 x_1 x_0$$

$$y_1 = \bar{x}_2 x_1 x_0 + x_2 \bar{x}_1 x_0 + x_2 x_1 \bar{x}_0 + x_2 x_1 x_0 = x_2 x_1 + x_2 x_0 + x_1 x_0$$

