

4.

$$(a) F(x, y, z) = \Sigma(0, 1, 2, 4)$$

$$D(x, y, z) = \Sigma(3, 6, 7)$$

$x \backslash yz$	00	01	11	10
0	1	1	X	1
1	1		X	X

Red circle around the top row (00, 01, 11, 10) is labeled  $x'$ .  
Black circle around the first column (00, 01) is labeled  $z'$ .

$$F = x' + z' \quad (\text{sum of products})$$

(b)

$$F(A, B, C, D) = \Sigma(1, 3, 5, 7, 9, 15)$$

$$D(A, B, C, D) = \Sigma(4, 10, 11, 12)$$

$AB \backslash CD$	00	01	11	10
00		1	1	
01	X	1	1	
11	X		1	
10		1	X	X

Red circle around the top two rows (00, 01) is labeled  $A'D$ .  
Red circle around the middle two rows (01, 11) is labeled  $CD$ .  
Black circle around the bottom two rows (10, 11) is labeled  $B'D$ .

$$F = CD + B'D + A'D \quad (\text{sum of products})$$