COSC 290.002

Class Exercises #6

1. **Truth Table**

Construct a truth table for the following:

1. F(x,y,z) = y’z + x’z

|  |  |  |  |
| --- | --- | --- | --- |
| x | y | z | F |
| 0 | 0 | 0 |  |
| 0 | 0 | 1 |  |
| 0 | 1 | 0 |  |
| 0 | 1 | 1 |  |
| 1 | 0 | 0 |  |
| 1 | 0 | 1 |  |
| 1 | 1 | 0 |  |
| 1 | 1 | 1 |  |

1. F(x, y, z) = x’y’z + xy

|  |  |  |  |
| --- | --- | --- | --- |
| x | y | z | F |
| 0 | 0 | 0 |  |
| 0 | 0 | 1 |  |
| 0 | 1 | 0 |  |
| 0 | 1 | 1 |  |
| 1 | 0 | 0 |  |
| 1 | 0 | 1 |  |
| 1 | 1 | 0 |  |
| 1 | 1 | 1 |  |

1. Assume you have the following truth tables for functions F1(x, y, z) and F2(x, y, z):

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| x | y | z | F1 | F2 |
| 0 | 0 | 0 | 1 | 0 |
| 0 | 0 | 1 | 1 | 0 |
| 0 | 1 | 0 | 0 | 1 |
| 0 | 1 | 1 | 0 | 0 |
| 1 | 0 | 0 | 0 | 1 |
| 1 | 0 | 1 | 1 | 0 |
| 1 | 1 | 0 | 1 | 1 |
| 1 | 1 | 1 | 0 | 0 |

1. Express F1 and F2 in sum-of-products form
2. Simplify each function
3. Consider two Boolean functions, f(x,y,z) and g(x,y,z). Use truth tables to prove the two functions, f(x,y,z) and g(x,y,z) are logically equivalent or not.

f**(x,y,z)=x(y’z + y) + x’(y + z’)’ g(x,y,z) = yz’ + xy**

1. Little Susie is trying to train her new puppy. She is trying to figure out when the puppy should get a dog biscuit as a reward. She has concluded the following:
   1. Give the puppy a biscuit if it sits and wiggles but does not bark.
   2. Give the puppy a biscuit if it barks and wiggles but does not sit.
   3. Give the puppy a biscuit if it sits but does not wiggle or bark
   4. Give the puppy a biscuit if it sits wiggles, and barks.
   5. Don’t give puppy a treat otherwise.

Use the following:

S: Sit (0 for not sitting; 1 for wiggling)

W: (Wiggles (0 for not wiggling; 1 for wiggling)

B: Barking (0 for not barking; 1 for barking)

F: Biscuit function (0, don’t give the puppy a biscuit; 1, give the puppy a biscuit)

Construct a truth table and find the minimized Boolean function to implement the logic telling Susie when to give her dog a biscuit.