**CS 200**

**Homework 1: Digital Logic**

Brandon Horner

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**Assignment**

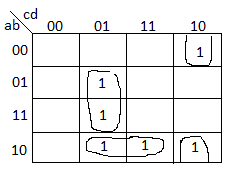
Answer each of the following questions.

1. Draw a truth table to demonstrate that (xy)' is equivalent to (x' + y'). (2 pts)

|  |  |  |  |
| --- | --- | --- | --- |
| F(xy)’ | x | y | F(x’+y’) |
| 1 | 0 | 0 | 1 |
| 1 | 0 | 1 | 1 |
| 1 | 1 | 0 | 1 |
| 0 | 1 | 1 | 0 |

1. Use a Karnaugh Map to reduce the following function to a minimal form. (4 pts)

F(a,b,c,d) = a'bc'd + abd + ab'd + ab'cd' + a'b'cd'



F`(a,b,c,d) = bc’d + ab‘d+ b’cd’

1. Use truth tables to show that your reduced function from question 2 is logically the same as the original function. Make a truth table for each and confirm their results are identical. (4 pts)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| bc’d + ab‘d+ b’cd’ | a | b | c | d | a'bc'd + abd + ab'd + ab'cd' + a'b'cd' |
| 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 1 | 0 |
| **1** | 0 | 0 | 1 | 0 | **1** |
| 0 | 0 | 0 | 1 | 1 | 0 |
| 0 | 0 | 1 | 0 | 0 | 0 |
| 1 | 0 | 1 | 0 | 1 | 1 |
| 0 | 0 | 1 | 1 | 0 | 0 |
| 0 | 0 | 1 | 1 | 1 | 0 |
| 0 | 1 | 0 | 0 | 0 | 0 |
| **1** | 1 | 0 | 0 | 1 | **1** |
| **1** | 1 | 0 | 1 | 0 | **1** |
| **1** | 1 | 0 | 1 | 1 | **1** |
| 0 | 1 | 1 | 0 | 0 | 0 |
| **1** | 1 | 1 | 0 | 1 | **1** |
| 0 | 1 | 1 | 1 | 0 | 0 |
| 0 | 1 | 1 | 1 | 1 | 0 |