

Logic design (2018 fall)

Quiz # 2

Name: \_\_\_\_\_ ID: \_\_\_\_\_

1. (30%) Simplify the following expression to a sum of products.

$$(A'+B'+C)'+[AB'C+(ABC)'(A'+B+C)]'$$

$$\begin{aligned} & (A'+B'+C)'+[AB'C+(ABC)'(A'+B+C)]' \\ &= ABC+[(A'+B+C)(ABC+AB'C)] \\ &= ABC+(A'+B+C)AC \\ &= ABC+ABC \\ &= ABC \end{aligned}$$

2. (30%) Factor the following expression to a product of sum.

$$A+BC+A'DE$$

$$\begin{aligned} & A+BC+A'DE \quad (\text{because: } X+YZ = (X+Y)(X+Z)) \\ &= A+(BC+A')(BC+D)(BC+E) \\ &= (A+A'+BC)(A+D+BC)(A+E+BC) \\ &= (A+B+D)(A+C+D)(A+C+E)(A+B+E) \end{aligned}$$

3. (40%) Prove whether the following two functions, G and F, are equal or not by filling the following truth table.

$$F=(W+X')(X'+Y)(W+Y')$$

$$G=(W+X')(W+Y')$$

W	X	Y	W+X'	X'+Y	W+Y'	F	G
0	0	0	1	1	1	1	1
0	0	1	1	1	0	0	0
0	1	0	0	0	1	0	0
0	1	1	0	1	0	0	0
1	0	0	1	1	1	1	1
1	0	1	1	1	1	1	1
1	1	0	1	0	1	0	1
1	1	1	1	1	1	1	1

The two functions are not equal!!