

Logic design (2017 fall)

Quiz # 2

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

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

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

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

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

$$B+EQ+CA$$

$$\begin{aligned} & B+EQ+CA \\ &= B(1+E+CA+Q+CA)+EQ+CA(1+E+Q) \\ &= B+EB+ACB+QB+ACB+EQ+AC+ACE+QAC \\ &= B(B+E+AC) + Q(B+E+AC) + AC(B+E+AC) \\ &= (B+Q+AC)(B+E+AC) \\ &= (B+Q+A)(B+Q+C)(B+E+A)(B+E+C) \end{aligned}$$

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

$$F=A'C' +AE$$

$$G=(A+C')(A'+E)$$

A	C	E	A'C'	AE	A'C'+ AE	A+C'	A'+E	(A+C')(A'+E)
0	0	0	1	0	1	1	1	1
0	0	1	1	0	1	1	1	1
0	1	0	0	0	0	0	1	0
0	1	1	0	0	0	0	1	0
1	0	0	0	0	0	1	0	0
1	0	1	0	1	1	1	1	1
1	1	0	0	0	0	1	0	0
1	1	1	0	1	1	1	1	1

Two function is equal!!