

Logic design (2016 spring)

Quiz # 2

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

1. (30%) Simplify the following expression to a minimum sum of products. Only individual variable should be complemented.

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

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

2. (50%) Verify the following two functions are equal or not with truth table.

$$F=W'XY+WZ$$

$$G=(W'+Z')(W+XY)$$

|   |   |   |   | F    |    |         | G     |      |               |
|---|---|---|---|------|----|---------|-------|------|---------------|
| W | X | Y | Z | W'XY | WZ | W'XY+WZ | W'+Z' | W+XY | (W'+Z')(W+XY) |
| 0 | 0 | 0 | 0 | 0    | 0  | 0       | 1     | 0    | 0             |
| 0 | 0 | 0 | 1 | 0    | 0  | 0       | 1     | 0    | 0             |
| 0 | 0 | 1 | 0 | 0    | 0  | 0       | 1     | 0    | 0             |
| 0 | 0 | 1 | 1 | 0    | 0  | 0       | 1     | 0    | 0             |
| 0 | 1 | 0 | 0 | 0    | 0  | 0       | 1     | 0    | 0             |
| 0 | 1 | 0 | 1 | 0    | 0  | 0       | 1     | 0    | 0             |
| 0 | 1 | 1 | 0 | 1    | 0  | 1       | 1     | 1    | 1             |
| 0 | 1 | 1 | 1 | 1    | 0  | 1       | 1     | 1    | 1             |
| 1 | 0 | 0 | 0 | 0    | 0  | 0       | 1     | 1    | 1             |
| 1 | 0 | 0 | 1 | 0    | 1  | 1       | 0     | 1    | 0             |
| 1 | 0 | 1 | 0 | 0    | 0  | 0       | 1     | 1    | 1             |
| 1 | 0 | 1 | 1 | 0    | 1  | 1       | 0     | 1    | 0             |
| 1 | 1 | 0 | 0 | 0    | 0  | 0       | 1     | 1    | 1             |
| 1 | 1 | 0 | 1 | 0    | 1  | 1       | 0     | 1    | 0             |
| 1 | 1 | 1 | 0 | 0    | 0  | 0       | 1     | 1    | 1             |
| 1 | 1 | 1 | 1 | 0    | 1  | 1       | 0     | 1    | 0             |

Two function not equal!!

3. (20%) Factor the following expression to obtain a product of sum.

$$T'W+UY+V$$

$$T'W+UY+V$$

$$=(V+T'W+U)(V+T'W+Y)$$

$$=(V+T'+U)(V+W+U)(V+T'+Y)(V+W+Y)$$

