

Introduction to Computer Architecture

CISC 3310 Principles of Computer Architecture
Lab Activity

Question 1

- Complete the truth table for the following Boolean expression:

$$\text{Output} = \overline{A} + B$$

A	B	Output
0	0	
0	1	
1	0	
1	1	

Question 2

- Complete the truth table for the following Boolean expression:

$$\text{Output} = \overline{A} + B$$

A	B	Output
0	0	
0	1	
1	0	
1	1	

- Complete the truth table for the following Boolean expression

$$\text{Output} = A + \overline{A}B$$

A	B	Output
0	0	
0	1	
1	0	
1	1	

Question 3

- Complete the truth table for the following Boolean expression

$$\text{Output} = \overline{A} + \overline{B} + C$$

A	B	C	Output
0	0	0	
0	0	1	
0	1	0	
0	1	1	
1	0	0	
1	0	1	
1	1	0	
1	1	1	

Question 4

- Complete the truth table for the following Boolean expression

$$\text{Output} = A(B + AC + \overline{A})$$

A	B	C	Output
0	0	0	
0	0	1	
0	1	0	
0	1	1	
1	0	0	
1	0	1	
1	1	0	
1	1	1	

Question 5

- Simplify each expression by algebraic manipulation. Try to recognize when it is appropriate to transform to the dual, simplify, and re-transform.

$$1) a + 0 = \underline{\hspace{2cm}}$$

$$2) \bar{a} \cdot 0 = \underline{\hspace{2cm}}$$

$$3) a + \bar{a} = \underline{\hspace{2cm}}$$

$$4) a + a = \underline{\hspace{2cm}}$$

$$5) a + ab = \underline{\hspace{2cm}}$$

$$6) a + \bar{a}b = \underline{\hspace{2cm}}$$

$$7) a(\bar{a} + b) = \underline{\hspace{2cm}}$$

$$8) ab + \bar{a}b = \underline{\hspace{2cm}}$$

$$9) (\bar{a} + \bar{b})(\bar{a} + b) = \underline{\hspace{2cm}}$$

$$10) a(a + b + c + \dots) = \underline{\hspace{2cm}}$$

Question 6

- Simplify each expression by algebraic manipulation. Try to recognize when it is appropriate to transform to the dual, simplify, and re-transform.

$$1) \quad y + y\bar{y} = \underline{\hspace{2cm}}$$

$$2) \quad xy + x\bar{y} = \underline{\hspace{2cm}}$$

$$3) \quad \bar{x} + y\bar{x} = \underline{\hspace{2cm}}$$

$$4) \quad (w + \bar{x} + y + \bar{z})y = \underline{\hspace{2cm}}$$

$$5) \quad (x + \bar{y})(x + y) = \underline{\hspace{2cm}}$$

$$6) \quad w + [w + (wx)] = \underline{\hspace{2cm}}$$

$$7) \quad x[x + (xy)] = \underline{\hspace{2cm}}$$

$$8) \quad \overline{(x + \bar{x})} = \underline{\hspace{2cm}}$$

$$9) \quad \overline{(x + \bar{x})} = \underline{\hspace{2cm}}$$

$$10) \quad w + (w\bar{x}yz) = \underline{\hspace{2cm}}$$

Questions?



K Maps

- Simplify the following Boolean expression:

$$\mathbf{F(A, B, C) = \sum m(0, 1, 4, 5) = \bar{A}\bar{B}\bar{C} + \bar{A}\bar{B}C + A\bar{B}\bar{C} + A\bar{B}C}$$

K Maps

- Simplify the following Boolean expression:

$$\mathbf{F(A, B, C) = \sum m(0, 1, 4, 6, 7) = \bar{A}\bar{B}\bar{C} + \bar{A}\bar{B}C + A\bar{B}\bar{C} + AB\bar{C} + ABC}$$

K Maps

- Simplify the following Boolean expression:

$$\mathbf{F(A, B, C) = \prod M(2, 3, 5) = (A + \bar{B} + C)(A + \bar{B} + \bar{C})(\bar{A} + B + \bar{C})}$$

- Write the results as a product-of-sum

Questions?

