

ECE 204L - BOOLEAN ALGEBRA - LAB 6

DEMORGAN'S LAWS

WINTER 2004

A.P. FELZER

OBJECTIVE

The objective of this lab is to verify DeMorgan's Laws of Boolean Algebra.

LAB

1. The objective of this problem is to verify the DeMorgan's Law equation given by

$$(X + Y)' = X' \cdot Y'$$

- a. **Prelab** - Draw a logic diagram with pin numbers to implement F1 as follows with AOI (and-or-inverter) gates

$$F1 = (X + Y)'$$

- b. **Prelab** - Draw the chip diagram with DIP switches for X and Y and LED's to indicate outputs. Be sure to include all the resistors.
- c. Build your circuit and then measure the truth table for F1
- d. **Prelab** - Draw a logic diagram with pin numbers to implement F2 as follows with AOI gates

$$F2 = X' \cdot Y'$$

- e. **Prelab** - Draw the chip diagram with DIP switches for X and Y and LED's to indicate outputs. Be sure to include all the resistors.
- f. Build your circuit and then measure the truth table for F2
- g. Make use of your measured results to verify that $(X + Y)' = X' \cdot Y'$

2. The objective of this problem is to verify the DeMorgan's Law equation given by

$$(X \cdot Y)' = X' + Y'$$

- a. **Prelab** - Draw a logic diagram with pin numbers to implement F3 as follows with AOI (and-or-inverter) gates

$$F3 = (X \cdot Y)'$$

- b. **Prelab** - Draw the chip diagram with DIP switches for X and Y and LED's to indicate outputs. Be sure to include all the resistors.
- c. Build your circuit and then measure the truth table for F3
- d. **Prelab** - Draw a logic diagram with pin numbers to implement F4 as follows with AOI gates

$$F4 = X' + Y'$$

- e. **Prelab** - Draw the chip diagram with DIP switches for X and Y and LED's to indicate outputs. Be sure to include all the resistors.
- f. Build your circuit and then measure the truth table for F4
- g. Make use of your measured results to verify that $(X \cdot Y)' = X' + Y'$