Computer Systems and Networks

ECPE 170 – Jeff Shafer – University of the Pacific

Exam 1 Review

Exam 1 Basics

- **Topics**
  - Chapter 2
    - Data representations
  - Chapter 3
    - Digital logic

- **Rules**
  - No calculators
  - Closed book / notes / friend / Internet / etc...

Review Materials

- ↗ Things to study
  - ↗ Homework assignments
    - ↗ **Solutions are posted in Sakai**
  - ↗ Quiz 1 and 2
    - ↗ **Solutions are posted in Sakai**
  - ↗ Lecture notes

- ↗ Question format will be similar to quizzes
  - ↗ Mix of problems and short answer questions
  - ↗ *Problems typically come from textbook…*
  - ↗ *Short answer questions typically come from lectures…*

Chapter 2 – Data Representation

Number Formats

↗ **Convert 26.78125_{10} to binary (max of 6 digits after binary point)**

↗ Ans: 11010.11001

Number Formats

↗ **Convert 110010011101_2 to hexadecimal**

↗ Ans: $C9D_{16}$

Number Formats

↗ **Express 23_{10} and -9_{10} in 8-bit binary using signed-magnitude, 1's complement, and 2's complement format**

↗ Ans for 23:
- ↗ Signed-magnitude: 00010111_2
- ↗ One's comp: 00010111_2
- ↗ Two's comp: 00010111_2

↗ Ans for -9
- ↗ Signed-magnitude: 10001001_2
- ↗ One's comp: 11110110_2
- ↗ Two's comp: 11110111_2

Number Formats

↗ **Convert 26.78125_{10} to IEEE 754 single-precision floating-point format**
(recall that $26.78125_{10} = 11010.11001$)

↗ Ans:

  ↗ Sign bit: 0 (i.e. positive)

  ↗ Exponent: 10000011 (i.e. 127+4=131)

  ↗ Significand: 1010110010….0 (for 23 bits)

Data Representation

- ↗ **What is ASCII? EBCDIC? Unicode?**
  - ↗ **What do they do the same? Different?**
  - ↗ **Why are there three standards?**

Chapter 3 – Digital Logic

Boolean Expressions

↗ **In the Boolean expression F(x,y)=x+y, does this mean "add the value to x to the value of y?"**

  ↗ No: the + operator is OR!

↗ **Order of operations: what do I do first? Second?**

$$F(x, y, z) = \overline{xyz}$$

  ↗ Equivalent way to write it:

$$F(x, y, z) = (xyz)'$$

Boolean Expression

↗ **Simplify the following Boolean expression:**

$$F(x, y, z) = xy + \overline{x}z + yz$$

$$F(x, y, z) = xy + \overline{x}z + (x + \overline{x})yz$$

$$F(x, y, z) = xy + \overline{x}z + xyz + \overline{x}yz$$

$$F(x, y, z) = xy + xyz + \overline{x}z + \overline{x}yz$$

$$F(x, y, z) = xy(1 + z) + \overline{x}z(1 + y)$$

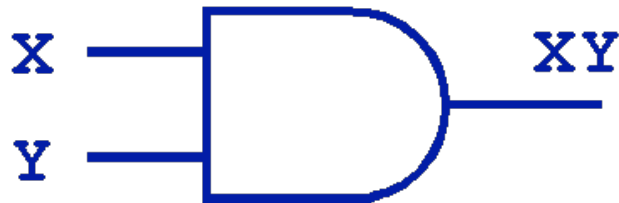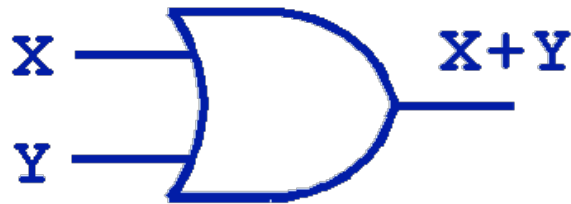$$F(x, y, z) = xy + \overline{x}z$$

Digital Logic

↗ **What is this gate?**
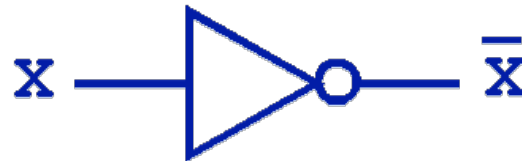
↗ **What is its truth table?**

Digital Logic

- ↗ **What is this gate?**

- ↗ **What is its truth table?**

Digital Logic

- ↗ **What is this gate?**

- ↗ **What is its truth table?**

X
Y
X+Y

Digital Logic

↗ **What is this gate?**

↗ **What is its truth table?**

$$X \oplus Y$$

Digital Logic

↗ **What is this gate?**

↗ **What is its truth table?**

Digital Logic
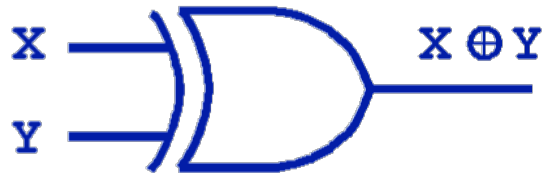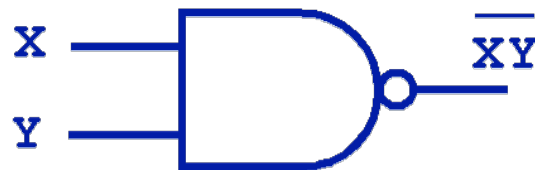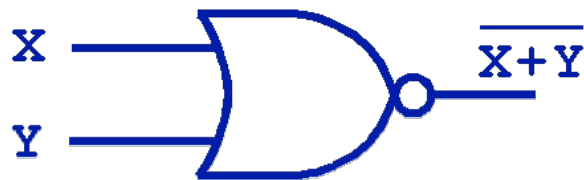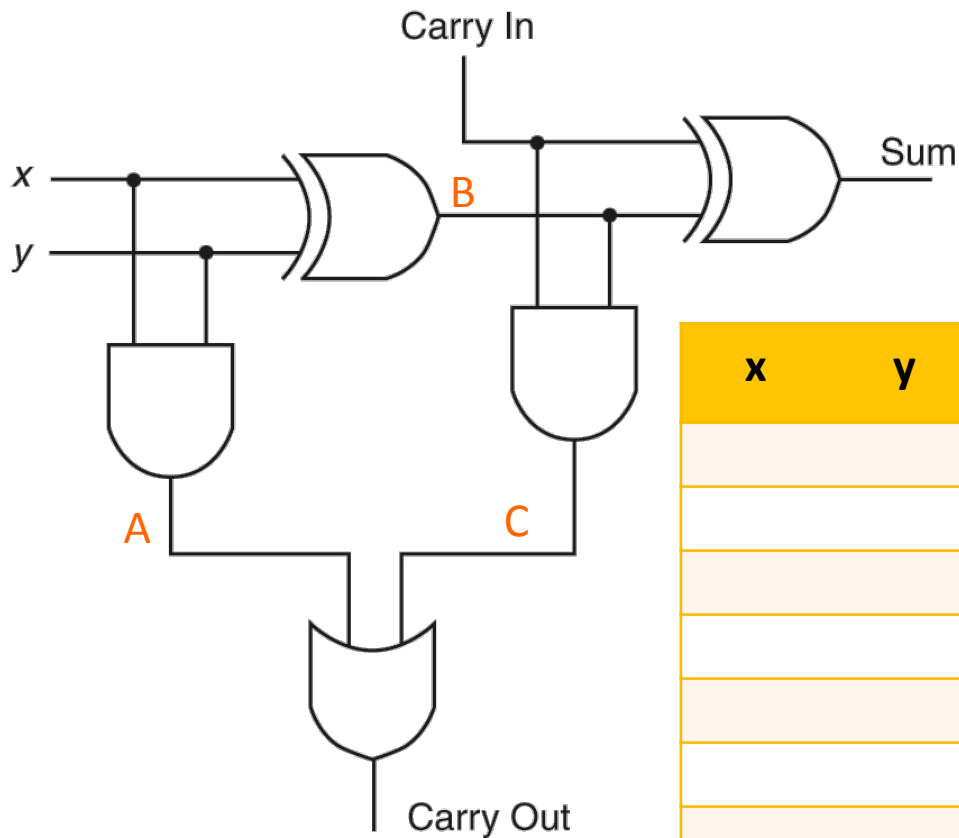
↗ **What is this gate?**

↗ **What is its truth table?**

$$X + Y \rightarrow \overline{X+Y}$$

Digital Logic

Carry In

Sum

B

x

y

A   C

Carry Out

Draw the truth table for this circuit

What is this circuit?

x	y	Cin	A	B	C	Sum	Cout

Digital Logic – Sequential

↗ **Give the truth table for an SR, JK, and D flip flop**

    ↗ **What does SR mean?**

    ↗ **What does JK mean?**

    ↗ **What does D mean?**

Karnaugh Maps

w	x	y	z	F
0	0	0	0	1
0	0	0	1	0
0	0	1	0	0
0	0	1	1	1
0	1	0	0	0
0	1	0	1	1
0	1	1	0	0
0	1	1	1	1
1	0	0	0	0
1	0	0	1	0
1	0	1	0	1
1	0	1	1	1
1	1	0	0	0
1	1	0	1	1
1	1	1	0	0
1	1	1	1	1

↗ **Construct a K-map from the truth table**

↗ **Simplify the resulting function**

$$F(w,x,y,z)= yz+xz+w'x'y'z'+wx'y$$