ASSIGNMENT 1
CSE 125

Instructions:

1. Solve all the problems.

2. Only hand-written submission is allowed. Typing is not allowed.

3. Scan the hand-written document using CamScanner or any other scanning apps.

4. Save the scanned copy in pdf format as DM1_CSE125_\<section>_\<roll>.pdf

Example: DM1_CSE125_50A_201-115-126.pdf

5. Submit the pdf in the 'Class Work' of Google Classroom.

6. Do not copy. Try it yourself. You will be rewarded for your honest effort.

1. Which of these sentences are propositions? What are the truth values of those that are propositions?

a) Do not pass go.

b) What a lovely bouquet!

c) $4 + x = 5$.

2. What is the negation of each of these propositions?

a) There are 13 items in a baker's dozen.

b) $2 + 1 = 3$.

c) The summer in Maine is hot and sunny.

3. Let p and q be the propositions "Swimming at the New Jersey shore is allowed" and "Sharks have been spotted near the shore," respectively. Express each of these compound propositions as an English sentence.

a)$\neg q$ b)$p \wedge q$ c)$\neg p \vee q$

d)$p \rightarrow \neg q$ e)$\neg q \rightarrow p$ f)$\neg p \rightarrow \neg q$

g)$p \leftrightarrow \neg q$ h)$\neg p \wedge (p \vee \neg q)$

4. Let p and q be the propositions.

p: You drive over 65 miles per hour.

q: You get a speeding ticket.

Write these propositions using p and q and logical connectives (including negations).

a) You do not drive over 65 miles per hour.

b) You drive over 65 miles per hour, but you do not get a speeding ticket.

c) You will get a speeding ticket if you drive over 65 miles per hour.

d) If you do not drive over 65 miles per hour, then you will not get a speeding ticket.

e) Driving over 65 miles per hour is sufficient for getting a speeding ticket.

f) You get a speeding ticket, but you do not drive over 65 miles per hour.

g) Whenever you get a speeding ticket, you are driving over 65 miles per hour.

5. Determine whether these biconditionals are true or false.

a) $2 + 2 = 4$ if and only if $1 + 1 = 2$.

b) $1 + 1 = 3$ if and only if monkeys can fly.

c) $0 > 1$ if and only if $2 > 1$.

d) $1 + 1 = 2$ if and only if $2 + 3 = 4$.

6. Determine whether each of these conditional statements is true or false.

a) If $1 + 1 = 2$, then $2 + 2 = 5$.

b) If $1 + 1 = 3$, then $2 + 2 = 5$.

c) If monkeys can fly, then $1 + 1 = 3$.

d) If $1 + 1 = 3$, then $2 + 2 = 4$.

7. Construct a truth table for the compound propositions: $(p \wedge q) \rightarrow (p \vee q)$

8. Find the bitwise *OR*, bitwise *AND*, and bitwise *XOR* of these pairs of bit strings: 1111 0000, 1010 1010

9. You can graduate only if you have completed the requirements of your major and you do not owe money to the university and you do not have an overdue library book. Express your answer in terms of

    g: **"You can graduate,"**

    m: **"You owe money to the university,"**

    r: **"You have completed the requirements of your major," and**

    b: **"You have an overdue library book."**

10. Use a truth table to verify the first De Morgan law $\neg(p \wedge q) \equiv \neg p \vee \neg q$.

11. Use De Morgan's laws to find the negation of the following statement: Carlos will bicycle or run tomorrow.

12. Let *P (x)* be the statement "$x = x^2$." If the domain consists of the integers, what are these truth values?

a) P (-1)   *b)* $\exists x P (x)$ *c)* $\forall x P (x)$ d)P (2)

13. Translate each of these statements into logical expressions by using predicates with two variables.

a) A student in your school has lived in Vietnam.

b) A student in your school knows Java and C++.

c) Everyone in your class enjoys Thai food.

d) There is a person in your school who is not happy.