Assignment #1

Due: Monday 28th of September, 2018 before 11:55 pm

Note:

1. Late submissions receive zero credit.
2. If you write only the correct answer without steps you get very low credit.
3. Submit in hard form.
4. Do not knock at the door. Just slide beneath the door.
5. Total marks are 66

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Q:-1. Let P and Q be the propositions **[Points 7]**

P: it is below freezing

Q: it is snowing.

Write these propositions using P and Q and logical connectives.

a) It is below freezing and snowing
b) It is below freezing but not snowing
c) It is not below freezing and it is not snowing
d) It is either snowing or below freezing
e) If it is below freezing than it is snowing
f) It is either below freezing or it is snowing
g) It is below freezing is necessary and sufficient for it to be snowing.

Q:- 2 Let P,Q and R be the propositions. **[Points 3]**

P: You got an A on the final exam.

Q: You do every exercise in this book.

R: You get an A in this class.

Write these propositions in terms of logical connectives and P,Q, R

a) You get an A in this class but you do not do every exercise.
b) Getting an A on the final and doing every exercise in this book is sufficient and necessary for getting an A in this class.
c) You will get an A in this class if and only if you either do every exercise in this book or you get an A on the final.

Q:-3 Determine whether these biconditionals are true or false. **[Points 6]**

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

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

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

d) 0 is greater than 1 if and only if 2 is greater than 1.

Q:- 4 Are these system specifications consistent. **[Points 5]**

"Whenever the software system is being upgraded, users cannot access the file system. If users can access the file system, then they can save new files, if users cannot save new files, then the system software is not being upgraded. "

Q:- 5 The following exercise relates to the inhabitants of the island of knights and knaves created by Smullyan where Knights always tell the truth and Knave always lie. You encounter two people A and B. Determine if possible what A and B are if they address you in the ways described. If you cannot determine what these two people are, can you draw any conclusions? **[Points 25]**

Do a rigorous analysis as we performed in the class by taking care of all the possibilities for both A and B. For each part if you came up with a **correct preposition** you get half the marks. The rest of the marks are for the analysis.

a) A says "at least one of us is a knave" and B says nothing.

b) A says "The two of us are both knights" and B says "A is a knave"

c) A says "I am a knave or B is a knight" and B says nothing

d) Both A and B says " I am a knight"

e) A says "We are both knaves" and B says nothing.

Q:-6 The problems below relate to inhabitants of an island on which there are three kinds of people: knights who always tell the truth, knaves who always lie, and spies (called normals by Smullyan [Sm78]) who can either lie or tell the truth. You encounter three people, A, B, and C. You know one of these people is a knight, one is a knave, and one is a spy. Each of the three people knows the type of person each of other two is. For each of these situations, if possible, determine whether there is a unique solution and determine who the knave, knight, and spy are. When there is no unique solution, list all possible solutions or state that there are no solutions. **[Points 20]**

Do a rigorous analysis as we performed in the class by taking care of all the possibilities for both A and B. For each part if you came up with a **correct preposition** you get half the marks. The rest of the marks are for the analysis.

a) A says "C is the knave," B says, "A is the knight," and C says "I am the spy."
b) A says "I am the knight," B says "I am the knave," and C says "B is the knight."
c) A says "I am the knave," B says "I am the knave," and C says "I am the knave."
d) A says "I am the knight," B says "A is telling the truth," and C says "I am the spy."

Good Luck