

**Homework #1**  
**Due Tuesday, 3/21**  
**(at the beginning of class)**

This homework is the sole work of: \_\_\_\_\_  
\_\_\_\_\_

Sources (People, URL's, Books etc.) consulted:

Source \_\_\_\_\_ for Problem # \_\_\_\_\_

Source \_\_\_\_\_ for Problem # \_\_\_\_\_

Source \_\_\_\_\_ for Problem # \_\_\_\_\_

Date: \_\_\_\_\_

**Each question is worth 5 Points**

#1.a) Construct truth tables for

i)  $p \vee q \rightarrow r$

ii)  $(p \rightarrow r) \wedge (q \rightarrow r)$

b) What is your conclusion about these?

#2. **Page 16, #8:** Let p, q, and r be the propositions

p: You have the flu

q: You miss the final examination

r: You pass the course

Express each of the following as an English sentence:

a)  $p \rightarrow q$       b)  $\sim q \leftarrow \rightarrow r$

c)  $q \rightarrow \sim r$       d)  $p \vee q \vee r$

e)  $(p \rightarrow \sim r) \vee (q \rightarrow \sim r)$

f)  $(p \wedge q) \vee (\sim p \wedge r)$

#3. **Page 17, #14** For each of these sentences, determine whether an inclusive or an exclusive or is intended. Explain your answer.

- a) Experience with C++ or Java is required.
- b) Lunch includes soup or salad
- c) To enter the country you need a passport or a voter registration card.
- d) Publish or perish

**#4. Page 40, #10:** Let  $C(x)$  be the statement “ $x$  has a cat”,  $D(x)$  be the statement “ $x$  has a dog”,  $F(x)$  be the statement “ $x$  has a ferret”. Express each of these statements in terms of  $C(x)$ ,  $D(x)$ ,  $F(x)$ , quantifiers and logical connectives. Let the universe of discourse consist of all students in your class.

- a) A student in your class has a cat, a dog, and a ferret.
- b) All students in your class have a cat, a dog, or a ferret.
- c) Some student in your class has a cat and a ferret, but not a dog.
- d) No student in your class has a cat, a dog and a ferret.
- e) For each of the 3 animals, cats, dogs, and ferrets, there is a student in your class who has one of these animals as a pet.

**#5. Page 53, #14** Use quantifiers and predicates with more than one variable to express these statements.

- a) There is a student in this class who can speak Hindi.
- b) Every student in this class plays some sport.
- c) Some student in this class has visited Alaska but has not visited Hawaii.
- d) All students in this class have learned at least one programming language.
- e) There is a student in this class who has taken every course offered by one of the departments in this school.
- f) Some student in this class grew up in the same town as exactly one other student in the class.
- g) Every student in this class has chatted with at least one other student in at least one chat group.

**#6. i) Page 73, #4** Construct an argument using rules of inference to show that the hypotheses “If it does not rain or if it is not foggy, then the sailing race will be held and the lifesaving demonstration will go on,” “If the sailing race is held, then the trophy will be awarded,” and “The trophy was not awarded” imply the conclusion “It rained.”

**ii) Page 74, #12** For each of these arguments determine whether the argument is correct or incorrect and explain why.

- a) Everyone enrolled in the university has lived in a dormitory. Mia has never lived in a dormitory. Therefore, Mia is not enrolled in the university.
- b) A convertible car is fun to drive. Isaac’s car is not a convertible. Therefore Isaac’s car is not fun to drive.
- c) Quincy likes all action movies. Quincy likes the movie *Eight men Out*. Therefore, *Eight men Out* is an action movie.
- d) All lobstermen set at least a dozen traps. Hamilton is a lobsterman. Therefore Hamilton sets at least a dozen traps.

**#7.** Prove or disprove: If  $1 + 1 = 4$ , then  $2 + 2 = 8$

#8. Given that an integer  $n$  is even if there is an integer  $i$  such that  $n = 2 * i$  and an integer  $n$  is odd if there is an integer  $i$  such that  $n = 2 * i + 1$ , prove that for every integer  $n \geq 0$ ,  $n$  is not both even and odd.