Spring 2014 CS201 Homework 1

Due 01/22/2014 11:59:59pm

**Q1 (10 points)**

 Write truth table for the statement.

(*p*∨ (∼*p* ∨ q)) ∧ ∼ (*q* ∧ ∼*r*)

**Q2 (10 points)**

Verify the logical equivalences.

∼ ((∼*p* ∧ *q*) ∨ (∼*p* ∧ ∼*q*)) ∨ (*p* ∧ *q*) ≡ *p*

**Q3 (10 points)**

Assume x is a particular real number and use De Morgan’s law to write negation for -2<x<7.

**Q4 (10 points)**

If compound X is boiling, then its temperature must be at least 250F. Assuming that this statement is true which of the following also be true.

a. If the temperature of compound X is at least 250F, then compound X is boiling.

b. If the temperature of compound X is less than 250F, then compound X is not boiling.

**Q5 (20 points)**

A set of premises and a conclusion are given. Use the valid argument forms to deduce the conclusion from the premises, giving a reason for each step.

a. ∼*p* ∨ *q* →*r*

b. *s* ∨ ∼*q*

c. ∼*t*

d. *p* → *t*

e. ∼*p* ∧ *r* →∼*s*

f. ∴ ∼*q*

**Q6 (10 points)**

(a) Rewrite the statement in English without using the symbol ∀ or ∃ or variables and expressing your answer as simply as possible, and (b) write a negation for the statement.

∀ colors C, ∃ an animal A such that A is colored C.

**Q7 (10 points)**

Give the contrapositive and inverse of the statement.

∀x ∈ R, if x(x+1) >0 then x>0 or x<-1

**Q8 (10 points)**

Use universal instantiation or universal modus ponens to fill in valid conclusions for the arguments.

For all real numbers a, b, c, and d, if b  ≠ 0 and d  ≠ 0, then a/b + c/d = (ad + bc)/bd.

a = 2, b = 3, c = 4, and d = 5 are particular real numbers such that b  ≠ 0 and d  ≠ 0.

∴ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ .

**Q9 (10 points)**

Use universal modus tollens to fill in valid conclusion for the argument.

All Healthy people eat an apple a day.

Harry does not eat an apple a day.

∴ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ .