Curtin University
Department of Computing
Quiz 1 – Semester 2, 2014

Subject: **Foundations of Computer Science 200**
Index No.: 12332

Name:…….

Student ID:……..

Practical Time:…….

Time Allowed: 45 MINUTES

1. Represent the following statements in propositional logic. You are required to define all necessary propositions and predicates used in your answers.

   (i) The difference of one positive integer and one negative real number is positive.

   (ii) Not all students in this class are working hard.

   (iii) You will pass this test only if you have done all the questions in the book.

   (iv) No two persons in this class have the same height.

   (v) There is only one system administrator in department of computing.

(5 marks)

2. Write out the truth table for the proposition of “implication”: $p \rightarrow q$. (3 marks)

3..

(a) Prove the following assertion: $n^3 - n$ is divisible by 3 for all positive integers n and disprove it when n is negative.

(b) The **dual** of a compound proposition that contains only the logical operators $\vee$, $\wedge$, and $\neg$ is the proposition obtained by replacing each $\vee$ by $\wedge$, each $\wedge$ by $\vee$, each **T** by **F** and each **F** by **T**. The **dual** of a proposition s is denoted by s^*. Find the **dual** of each of these propositions and simplify them if possible.

- $p \wedge \neg q \vee \neg r$
- $(p \vee F) \wedge (q \vee T)$

(c) Determine whether the following argument is valid.

Some positive integers can be written as the sum of the squares of two integers.

(12 marks)

4. Find the negations for the following propositions and simplify them if possible.

a) $\neg(\forall x \in D, \{(P(x) \vee Q(x)) \wedge R(x)\}) = ?$

b) $\neg(q \wedge (\neg p \vee \neg q))$=?

c) $\neg(\exists x(P(x) \wedge \forall y(P(y) \rightarrow x = y)) = ?$

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(5 marks)