Homework 4: Predicate Logic and Quantifiers

Submission policy. Submit your answers on paper **before** the class starts on **Monday**, Feb. 17, 2020. No late submissions accepted.

1. Handwritten answers are fine but please make sure they are readable.

2. Your name should be printed at the very top of the document.

Administration. This assignment will be graded by the GTA.

Practice Questions – Do NOT submit these.

Textbook questions 4.1, 4.3, 4.4, 4.7

Question that will be graded. Total Points 100.

Exercise 1.
Part a [50 points].

Using De Morgan's law, write the negation of the following statement and show that it is TRUE. Your proof can be informal. Justify each step.

$$\forall x \in \Re : x^2 > x$$

Part b [50 points].

For each of the following arguments, state whether it is sound or not sound and clearly explain why. Hint: rewrite the first premise as a conditional statement (with the proper quantifier).

1.

All healthy people eat an apple a day.
Helen eats an apple a day.

_____

Helen is a healthy person.

2.

All healthy people eat an apple a day.
Herbert is not a healthy person.

_____

Herbert does not eat an apple a day.

3.

If the product of two numbers is 0, then at least one of the two numbers is 0.
For a particular number x, neither $(x-1)$ nor $(x+1)$ equals 0.

_____

The product $(x-1)(x+1)$ is not 0.

4.

All cheaters sit in the back row.
George sits in the back row.

_____

George is a cheater.

5.

All honest people pay their taxes.
Matthew is not honest.

_____

Matthew does not pay his taxes.