UNIVERSITY OF WESTERN ONTARIO

Computer Science 2214a, Fall 2013 - 2014
Discrete Structures for Computing

ASSIGNMENT 2
Given: Wed. Oct. 2, Due: Wed. Oct. 9, 6:00pm

1. Prove that the following is true for all positive integers n:

$$n \textit{ is even if and only if } 3n^2 + 8 \textit{ is even.}$$

2. (a) Consider the following theorem: *If x is an odd integer, then $x + 2$ is odd.* Give a proof by contraposition of this theorem.

(b) Give a proof by cases that $x \leq |x|$ for all real numbers x, where $|x|$ is the absolute value of x.

3. Prove that at least one of the real numbers $a_1, a_2, \cdots, a_n$, where $n \geq 2$, is greater than or equal to the average of these numbers. What kind of proof did you use?

4. Prove that for any integer n, the floor of $n/2$ (denoted by $\lfloor n/2 \rfloor$), equals $n/2$ if n is even, and $(n-1)/2$ if n is odd. Give detailed justifications for your answer.

5. You take a job that pays $\$75,000$ annually.

(a) How much do you earn n years from now if you receive a five percent raise each year?

(b) How much do you earn n years from now if each year you receive a raise of $\$1,000$ plus two percent of your previous year's salary.