

# CMSC 250 Homework 8 Fall 2005

0201 & 0202

Due Wed Oct 26 at the beginning of your discussion section.

**You must write the solutions to the problems single-sided on your own lined paper, with all sheets stapled together, and with all answers written in sequential order or you will lose points.**

For each of the following statements, prove that the statement is true, or give a counterexample to show that it is false.

1.

$$\forall n \in \mathbb{Z}^{\geq 1}, \sum_{i=0}^n 2(-7)^n (-1)^{i+1} = \frac{(1 - (-7)^{n+1})}{4}$$

2.

$$\forall n \in \mathbb{Z}^{\geq 0}, 3|(n^3 + 2n)$$

3.

$$\forall n \in \mathbb{Z}^{\geq 1}, \sum_{i=0}^n (2i+1)^2 = \frac{(n+1)(2n+1)(2n+3)}{3}$$

4.

$$\forall n \in \mathbb{Z}^{>1}, \sum_{i=1}^n \frac{1}{i^2} < (2 - \frac{1}{n})$$

5.

$$\forall n \in \mathbb{Z}^{\geq 4}, 2n+3 \leq 2^n$$

6.

$$\forall n \in \mathbb{Z}^{>3}, n^2 < n!$$

7.

$$\forall n \in \mathbb{Z}^{odd, \geq 1}, (8|(n^2 - 1))$$