CSCI 480, Spring 2018
Math Exercises # 2

YOUR NAME HERE

Due date: Tuesday, May 1, midnight.

Prove each of the following statements. Explicitly state which method of proof you are using: direct, contrapositive, contradiction, induction, *etc.*

Format all solutions in LaTeX. Please note any time you use **Sympy** or other software to simplify algebraic expressions, and include the transcript of the interaction.

1. If two integers have the same parity, then their sum is even.
2. Suppose $a \in \mathbb{Z}$. If a^2 is not divisible by 4, then a is odd.
3. Suppose $a, b \in \mathbb{Z}$. If $4 \mid (a^2 + b^2)$, then a and b are not both odd.
4. For all $n \in \mathbb{N}$:
$$\sum_{i=1}^{n} i(i+1) = \frac{n(n+1)(n+2)}{3}$$
5. For all $n \in \mathbb{N}$:
$$\sum_{i=1}^{n} (8i - 5) = 4n^2 - n$$
6. For all $n \in \mathbb{N}$:
$$9 \mid (4^{3n} + 8)$$