Written Homework 1
Due: Tuesday, February 24

Write your answers in *complete sentences and paragraphs*. Any equations should be part of sentences; for instance,

$$x = 3$$
$$x^2 = 9$$

is not written in sentences! Rather, you should do

Let $x = 3$. Then $x^2 = 9$.

Finally don't skip any steps. Every statement should have a justification that you can point to in the textbook (for instance: definition of even, Theorem 4.1.1, etc.). The only exception is elementary algebraic properties you learned in high school: commutativity of addition, distributive law, etc.

1. Suppose that $n \in \mathbb{Z}$ is odd. Prove that $n^2 - 224n + 357$ is even.
2. Disprove the statement, "If m and n are integers, then $m^2 - n^2$ is even."
3. Suppose that $n \in \mathbb{Z}$ and $n \geq 8$. Prove that $n^2 - 36$ is composite.
4. Suppose that r and s are rational numbers. Prove that their average is also rational.