CSCI 480, Winter 2017
Math Exercises # 2

YOUR NAME HERE

Due date: Wednesday, February 1, midnight.

Turn in both the tex and pdf files (not zipped): `math02.tex` and `math02.pdf`.

Exercises for Chapter 4 Use the method of direct proof to prove the following statements.

16. If two integers have the same parity, then their sum is even.

Exercises for Chapter 5 Use the method of contrapositive proof to prove the following statements.

12. Suppose $a \in \mathbb{Z}$. If a^2 is not divisible by 4, then a is odd.

Exercises for Chapter 6 Use the method of proof by contradiction to prove the following statements.

18. Suppose $a, b \in \mathbb{Z}$. If $4 \mid (a^2 + b^2)$, then a and b are not both odd.

Exercises for Chapter 7 State clearly which method of proof you are using.

24. If $a \in \mathbb{Z}$, then $4 \nmid (a^2 - 3)$.

Exercises for Chapter 8

20. Prove that $\{9^n : n \in \mathbb{Q}\} = \{3^n : n \in \mathbb{Q}\}$.

Exercises for Chapter 9 Each of the following statements is either true or false. If a statement is true, prove it. If a statement is false, disprove it.

18. If $a, b, c \in \mathbb{N}$, then at least one of $a - b$, $a + c$, and $b - c$ is even.

Exercises for Chapter 10

2. For every integer $n \in \mathbb{N}$, it follows that

$$\sum_{i=1}^{n} i^2 = \frac{n(n+1)(2n+1)}{6}$$

6. For every natural number n, it follows that

$$\sum_{i=1}^{n} (8i - 5) = 4n^2 - n$$

10. For every integer $n \geq 0$, it follows that $3 \mid (5^{2n} - 1)$.

14. Suppose $a \in \mathbb{Z}$. Prove that $5 \mid 2^n a$ implies $5 \mid a$ for any $n \in \mathbb{N}$.