



CSE 15: Discrete Mathematics

Homework 4

Spring 2020

Introduction

The purpose of this assignment is to give you more practice with mathematical proofs, specifically direct proofs, proofs by contraposition, proofs by contradiction, and proofs by induction. As always, you will also be practicing your \LaTeX skills.

Exercises

Create a new \LaTeX document and type out the solutions to the following exercises. Your document should include an appropriate title, your name, as well as a date. Please number your solutions appropriately. Upload your `.tex` and your `.pdf` files under the relevant CatCourses assignment.

Prove (or disprove) the following results, showing all steps of your argument.

1. The sum of two odd integers is even.
2. The sum of two even integers is even.
3. The square of an even number is even.
4. The product of two odd integers is odd.
5. If $n^3 + 5$ is odd then n is even, for any $n \in \mathbb{Z}$.
6. If $3n + 2$ is even then n is even, for any $n \in \mathbb{Z}$.
7. The sum of a rational number and an irrational number is irrational.
8. The product of two irrational numbers is irrational.
9. Use mathematical induction to prove that the first n even integers add up to $n(n + 1)$.
10. Use mathematical induction to prove that $n^3 + 2n$ is divisible by 3.