

Homework 1

due October 2, 2015

1. Rosen 1.1 #5, pg. 13

Use the well-ordering principle to show that $\sqrt{3}$ is irrational.

2. Rosen 1.1 #11, pg. 13

What is the value of $[x] + [-x]$ where x is a real number?

3. Rosen 1.3 #8, pg. 27

Use induction to prove that $\sum_{k=1}^n k^3 = \left(\frac{n(n+1)}{2}\right)^2$ for every positive integer n .

4. Rosen 1.4 #7, pg. 33

Find and prove a simple formula for the sum of the first n Fibonacci numbers with odd indices when n is a positive integer. That is, find a simple formula for $f_1 + f_3 + \cdots + f_{2n-1}$.

5. Rosen 1.5 #36, pg. 41

Show that if a is an integer, then 3 divides $a^3 - a$.

6. Rosen 1.5 #46, pg. 42

Show that the n -th Fibonacci number f_n is divisible by 4 if and only if n is divisible by 6.