Introduction to Abstract Mathematics
Spring 2017

Assignment 4.2
Due February 10

Exercise 1. Let x and y be real numbers. Use the hint of exercise 6.1.12 to prove that

$$x^n - y^n = (x-y)\sum_{k=0}^{n-1} x^{n-k-1}y^k = (x-y)(x^{n-1} + x^{n-2}y + \cdots + xy^{n-2} + y^{n-1})$$

for all $n \in \mathbb{N}$.

Exercise 2. Let F_n denote the nth Fibonacci number (where, as in class, we set $F_0 = 0$ and $F_1 = 1$). Prove that for all $n \geq 0$,

$$F_n = \frac{1}{\sqrt{5}}\left(\left(\frac{1+\sqrt{5}}{2}\right)^n - \left(\frac{1-\sqrt{5}}{2}\right)^n\right).$$

Exercise 3. Textbook exercise 6.1.7.

Exercise 4. Textbook exercise 6.2.12. [*Suggestion:* See Example 6.2.4.]