

Discrete Mathematics II
MTH182 – Section 001 – Spring 2015

Problem set 1
Review of proof by induction

Reading: Discrete Mathematics, first edition, section Sections 4.1, 4.2 Section 4.1: 1, 3, 5, 7 Section 4.2: 1, 9

Section 4.1

1. Prove that $\frac{1}{2 \cdot 3} + \frac{1}{3 \cdot 4} + \cdots + \frac{1}{(n+1)(n+2)} = \frac{n}{2n+4}$ for every positive integer n .
3. Prove that $\frac{1}{1 \cdot 4} + \frac{1}{4 \cdot 7} + \frac{1}{7 \cdot 10} + \cdots + \frac{1}{(3n-2)(3n+1)} = \frac{n}{3n+1}$ for every positive integer n .
5. Prove that $1 + 5 + 9 + \cdots + (4n - 3) = n(2n - 1)$ for every positive integer n .
7. Prove the result in Result 4.5 in the book: For every positive integer n , $1^2 + 2^2 + \cdots + n^2 = \frac{n(n+1)(2n+1)}{6}$.

Section 4.2

1. Use induction to prove that $2^n > n$ for every nonnegative integer n .
9. Prove by induction that $n^2 + n + 1$ is odd for every nonnegative integer n .