Math 135: Discrete Mathematics, Spring 2010
Worksheet 3

1. Prove that $3 + 3 \cdot 5 + 3 \cdot 5^2 + \cdots + 3 \cdot 5^n = 3(5^{n+1} - 1)/4$ when n is a nonnegative integer.

2. Prove that $1 \cdot 2 + 2 \cdot 3 + 3 \cdot 4 + \cdots + n(n+1) = n(n+1)(n+2)/3$ whenever n is a positive integer.

3. For which nonnegative integers is $n^2 \leq n!$? Prove your answer using induction.

4. Use induction to show that for all $n \geq 0$, $10^n - 1$ is divisible by 9.

5. What amounts of postage can be made using only 5 and 6 cent stamps? Prove your answer using induction.