

## Math 135: Discrete Mathematics, Fall 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.