

**Math 724, Fall 2013**  
**Homework #1**

**Instructions:** Write up your solutions in LaTeX and hand in a hard copy in class on **Friday, September 6**. Collaboration is allowed (and in fact encouraged), but each student must write up his or her solutions independently and acknowledge all collaborators.

(#1) Problem #13 (Bogart, p.7)

(#2) Problem #19 (p.8)

(#3) Problem #20 (p.9)

(#4) Chapter 1 Supplementary Problem #1 (p.30)

(#5) Chapter 1 Supplementary Problem #2 (p.30)

(#6) Chapter 1 Supplementary Problem #8 (p.31)

(#7) Let  $a_n = \sum_{k=0}^n \binom{n}{k}^2$ . Calculate  $a_n$  for  $0 \leq n \leq 3$ . Stare at Pascal's triangle and make a conjecture about the value of  $a_n$ . If you like, use Sage or another computer algebra system to check that your conjecture works for a few more values of  $n$ . Prove your conjecture using a bijection. (There may be a proof by induction, but it's probably disgusting.)