Quiz 5 – MAD 2104 - Summer A 2014 **NAME:** _____

This is a take-home quiz. Due date is Monday, June 16. Even for the short problems, please add a brief explanation to the answer.

1. (8 pts) (a) How many functions are there from a set with five elements to a set with three elements?

(b) How many **one-to-one** functions are there from a set with five elements to a set with three elements?

(c) How many **one-to-one** functions are there from a set with five elements to a set with eight elements?

(d) How many **onto** functions are there from a set with eight elements to a set with five elements?

2. (8 pts) How many strings of five lowercase letters in the English alphabet contain:

(a) the letter a?

(b) the letters a and b?

(c) the letters a and b in consecutive positions with a preceding b, with all letters distinct?

(d) the letters a and b, where a is somewhere to the left of b in the string, with all letters distinct?

3. (8 pts) (a) Use the binomial theorem to show that

$$C(n,0) \ - \ C(n,1) \ + \ C(n,2) \ - \ C(n,3) \ + \ ... \ + (-1)^n C(n,n) = 0.$$

(b) How many subsets with an odd number of elements does a set with 10 elements have?

4. (4 pts) How many numbers must be selected from the set $\{1,3,5,7,9,11,13,15,17\}$ to guarantee that at least one pair of these numbers have an average of 9?