

Four of these problems will be graded (my choice, not yours!), with each problem worth 5 points. Clear and complete justification is required for full credit. You are welcome to discuss these problems with anyone and everyone, but must write up your own final submission without reference to any sources other than the textbook and instructor.

1. Do the Combinatorics assignment on WeBWorK, available via <http://crlinwebwork2.coe.edu/webwork2/MTH-215/Combinatorics>.

2. For  $n \geq k \geq 0$ ,  $C(n, k) = \frac{n!}{k!(n-k)!}$ .

3. You know that you changed your password to “aphasia\*666” yesterday when they forced you to update it, and you know that you capitalized exactly three of the letters, but you can’t remember which ones. How many different possibilities are there?

4. The Banana Theorem: Let  $A$  be a set with  $n$  elements of  $k$  different types (such that elements of the same type are regarded as indistinguishable from one another for purposes of orderings). Let  $n_i$  be the number of elements of type  $i$  for each integer  $i$  from 1 to  $k$ . Then the number of different arrangements of the elements in  $A$  will be

$$\frac{n!}{\prod_{i=1}^k (n_i)!}$$

5. How many distinguishable ways can the letters in the word sleeplessness be arranged?

6. If a jar contains five balls, one red, three blue, and one white, and two balls are drawn at random from the jar (without replacement), what is the probability that neither ball is blue?

7. If a jar contains five balls, one red, three blue, and one white, and two balls are drawn at random from the jar (without replacement), what is the probability that one ball is blue if you know that the other one is not blue?

8. If a jar contains four balls, one red, two blue, and one white, and two balls are drawn at random from the jar (without replacement), what is the probability that the red ball is drawn?

9. If a jar contains four balls, one red, two blue, and one white, and two balls are drawn at random from the jar (without replacement), what is the probability that the red ball is drawn if you know that not both balls drawn were blue?

10. “In the jungle, you must wait, until the dice read 5 or 8” – from the movie Jumanji. What is the probability of a 5 or 8 total when two standard dice are rolled?