Homework 1, Math 3012, Summer 2010

January 11, 2017

1. Determine the number of strings of length 5 one can make from the letters T, R, I, S, K, A, I, D, E, K, A, P, H, O, B, I, A. Here, you assume that each letter in your string appears no more times than it does in the word TRISKAIDEKAPHOBIA – for example, you string of length 5 cannot have more than three A's.

2. You have two circles, one small and one large, with 5 equally spaced dots around them. Assume the two circles share one of the dots; so, there are 9 dots in total among the two circles. You want to place the numbers 1 through 9 at each of the dots, and then count the number of different configurations that can result. Note that we will not consider "mirror image" configurations to count as "the same one".

3. Determine the number of solutions to the following inequality:

$$10 \ \leq \ x_1 + x_2 + x_3 + x_4 \ \leq \ 20,$$

where

$$x_1, x_2 \ \geq \ 0; \ x_3, x_4 \ \geq \ 1,$$

and where

$$x_1, x_2, x_3, \text{ and } x_4 \text{ are integers.}$$

4. Determine the coefficient of a^8b^3 in

$$(2a^2b - 7a + 3)^{10}.$$

Write your answer in terms of factorials, and show all work (Obviously you can type this into a calculator and get the answer – the procedure is what is important here, not the answer).

5. Determine the number of permutations of the string AABBBCCDDD having no three B's in a row.