

Math 55 Quiz 9
October 26, 2016

This quiz will be graded out of 15 points; the True/False question is worth 3 points, and the exercise is worth 12 points. Please read the instructions carefully.

True or False. Mark the following statements as either true or false, or leave a blank if you don't know. A correct answer is worth +1 point, a blank is worth 0 points, and an incorrect answer is worth -1 points, so be smart about guessing!

- a. F If we roll two six-sided dice, the probability that at least one of the dice will come up with a 6 is $1/3$.
- b. F The problem of counting permutations with some indistinguishable elements can be solved using the "dogs and biscuits" method of counting.
- c. F There are exactly 6 ways to put 5 indistinguishable objects into indistinguishable boxes.



Exercise. We have a set of five 6-sided dice which are unusually labeled with the numbers 0, 1, 2, 3, 4, and 5. What is the probability of rolling a total of 5 when rolling this set of dice?

This is the same as counting the solutions of

$$x_1 + x_2 + x_3 + x_4 + x_5 = 5$$

in the nonnegative integers, and then dividing by the total number of possible outcomes, which is 6^5 . The desired numerator can be counted using "dogs and biscuits", where the dogs are the variables x_i and the biscuits are the 1s in the sum, of which there are 5. Thus we get $\binom{5+5-1}{5} = \binom{9}{5}$ solutions, and a probability of $\binom{9}{5}/6^5$.