MAT-CSC A67: Discrete Mathematics — Summer 2024

Quiz 12

Due Date: Friday, August 2, 11:59 PM, on Crowdmark

Q1. A bag contains 25 red balls and 15 blue balls. Two are chosen at random one after the other, without replacement (*i.e.*, once you take the first one out, there are now 39 balls in the bag). Determine each of the following probabilities:

1.a. What is the probability that exactly one ball is red?

1.b. What is the probability that both balls are red?

1.c. What is the probability that the first ball is red and second is not?

1.d. What is the probability that the first ball is not red and the second is red?

1.e. What is the probability that neither ball is red?

1.f. What is the probability that the second ball is red?

1.g. What is the probability that at least one ball is red?

Q2. **[Extra Questions]** Here are some extra questions for you to practice. These questions won't be graded.

2.a. Consider a dial having a pointer that is equally likely to point to each of n regions numbered $1, 2, \ldots, n$. If I spin the dial 3 times, what is the probability that the sum of the selected numbers is exactly n?

2.b. Suppose $k \geq 1$ and $(x_1, \ldots, x_k)$ is a randomly chosen k-permutation of $\{1, \ldots, n\}$ (*i.e.*, an ordered arrangement of k distinct elements, chosen uniformly from all such arrangements). What is the probability that it is a strictly increasing sequence, *i.e.*, that $x_1 < x_2 < \ldots < x_k$?