

Math 55 Section 101 Quiz 7

Note You can leave your final answers in unsimplified form (no need to break out a calculator).

Problem 1 (7.1 Q 33) What is the probability that Abby, Barry and Silvia win the first, second and third prizes, respectively, in a drawing if 200 people enter a context and:

1.A (3 pt) No one can win more than one prize.

Answer: The total number of possible outcomes is $P(200, 3)$. This corresponds to number of ways of choosing first, second and third place, with no repeats. The outcome described here is a single possibility out of all of these, so the probability of it happening is $\frac{1}{|S|} = \frac{1}{P(200,3)}$.

1.A (3 pt) Winning more than one prize is allowed.

Answer: Now the total number of possible outcomes is 200^3 . This corresponds to number of ways of choosing first, second and third places with repeats. The outcome described here is still a single possibility out of all of these, so the probability of it happening is $\frac{1}{|S|} = \frac{1}{200^3}$.

Problem 2 Suppose that I have a pair of 10 sided dice with numbers 1 to 10.

2.A (2 pt) What is the probability of rolling a total of 4 with these dice? (There is one more question on the back).

Answer: When a 4 is rolled, the first roll can only be 1, 2 or 3. Note that 4 cannot be rolled because the last roll will be atleast 1. The second roll is determined by the first: if the first was k , then the second must be $4 - k$. Thus the number of such rolls is 3 and the probability is $\frac{3}{10^2}$.

2.B (2 pt) Find a formula for the probability of rolling a total of k where $2 \leq k \leq 11$ and prove its correctness.

Answer: Using the same reasoning as above, when a $k \leq 11$ is rolled, the first roll can only be $1, 2, \dots, k - 1$. Note that k itself cannot be rolled because the last roll will be at least 1. The second roll is determined by the first: if the first was j , then the second must be $k - j$. Thus the number of such rolls is $k - 1$ and the probability is $\frac{k-1}{10^2}$.