Math 155 - Day #21: Probability

The probability of an event happening is the likelihood that the event occurs.

Mathematically, we can compute the probability of an event by finding all possible ways that event can occur, along with all possible ways any outcome can occur.

We write the probability of event A as: $P(A)$

$$P(A) = \frac{\# \text{ of ways event } A \text{ can occur}}{\# \text{ of possible outcomes}}$$

Note: This is only true if all possible outcomes are equally likely

Example: Rolling a fair 6-sided die, what is the probability of rolling 3? There are 6 possible outcomes on a die, which are equally likely. And 1 outcome is rolling a 3

So, $P(\text{rolling a 6}) = \frac{1}{6}$

Example: Rolling a fair 6-sided die, what is the probability of rolling an even?

There are still 6 possible outcomes, but now there 3 that outcomes that are even: 2, 4, 6

So, $P(\text{rolling an even}) = \frac{3}{6} = \frac{1}{2}$

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We write the probability of event A as: $P(A)$

$$P(A) = \frac{\#\text{ of ways event } A \text{ can occur}}{\#\text{ of possible outcomes}}$$

Suppose that you have a bin with 8 red balls, 7 blue balls, and 3 green balls. You reach in and pull one out.

Example: What is the probability of drawing a green ball?

There are $8 + 7 + 3 = 18$ total possible outcomes for what gets drawn

3 of the outcomes are green balls

So, $P(\text{drawing a green ball}) = \frac{3}{18}$

Example: What is the probability of not drawing a blue ball?

The ball drawn is not blue, then it is either red or green. There are $8 + 3 = 11$ outcomes that are not blue out of the 18 total outcomes.

So, $P(\text{not drawing a blue ball}) = \frac{11}{18}$

Example: What is the probability of drawing a red ball?

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Suppose that you have a bin with 6 red balls, 10 blue balls, and 5 green balls. You reach in and pull one out.

Example: What is the probability of drawing a blue ball?

Example: What is the probability of not drawing a red ball?

Things to come Example: Suppose you pull 2 balls out, what is the probability that both are green?