Probability and Statistics: A Primer for Beginners and Pre-Beginners

The Journey Begins: Probability Theory
Part Seven: Finishing Up

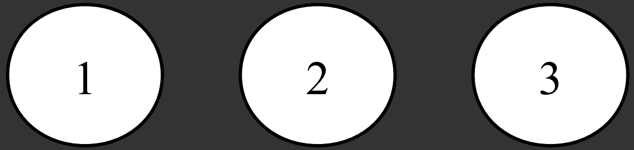
From Counts to Probabilities

Last time, we learned how to count all the possible outcomes of an experiment. In our examples, like picking a lottery number, all the possible outcomes had the same probability of occurring. This property turns out to be pretty handy.

Let's say we're picking one of three balls. Our sample space is

$$\Omega = \{1,2,3\}$$

We know that the probability of picking any ball is 1/3. Each ball has the same probability as any other.



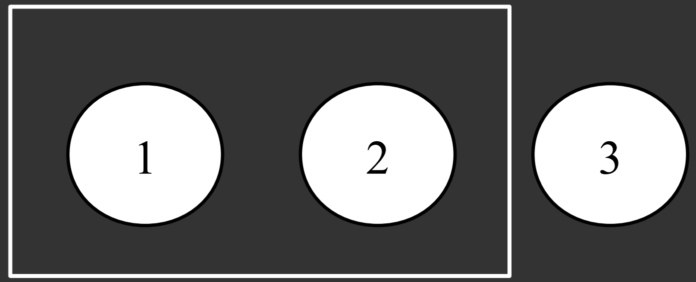
From Counts to Probabilities

Now, though, let's examine the probability that we would pick, say, either ball 1 or ball 2. Let that event be defined as

$$A = \{1,2\}$$

Since picking ball 1 is *disjoint* with picking ball 2, we can use the third axiom of probability:

$$P(A) = P(1)+P(2) = 1/3 + 1/3 = 2/3$$



A

Generalization

Ok, so now you probably see that we get the probability of A by dividing the number of outcomes in A (2) by the number of outcomes in Ω(3).

Of course, we can calculate this for any number of outcomes. If an experiment has N outcomes that are equally likely, then

$$\Omega = \{a_1, \ldots, a_n\} \text{ and } P(a_i) = 1/N \text{ for every outcome in } \Omega$$

$$P(A) = \sum_{a_i \in A} P(a_i) = \sum_{a_i \in A} \frac{1}{N}$$

So you just divide the number of outcomes in A by the total possible outcomes!