Discrete Random Variables

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As the introduction suggests, the first part of this module will be devoted to discrete random variables: variables whose possible values are a list of distinct values. In order to decide on some notation, let's look at the coin toss example again:

A fair coin is tossed twice. Let the random variable X be the number of tails we get in this random experiment. In this case, the possible values that X can assume are 0 (if we get HH), 1 (if get HT or TH) , and 2 (if we get TT).

Notation

If we want to find the probability of the event "getting 1 tail," we'll write: **P(X = 1)**

If we want to find the probability of the event "getting 0 tails," we'll write: **P(X = 0)**

In general, we'll write: **P(X = x)** to denote the probability that the discrete random variable X gets the value x.

Note that for the random variables we'll use a capital letter, and for the value we'll use a lowercase letter.

Section Plan

The way this section on discrete random variables is organized is very similar to the way we organized our discussion about one quantitative variable in the Exploratory Data Analysis sections. It will be separated into four parts.

1. We'll first discuss the probability **distribution** of a discrete random variable, ways to display it, and how to use it in order to find probabilities of interest.

2. We'll then move on to talk about the **mean and standard deviation** of a discrete random variable, which are measures of the center and spread of its distribution.

3. Next we'll have an optional chapter on the **rules for means and standard deviations**.

4. We'll conclude this part by discussing a special and very common class of discrete random variable: the **binomial** random variable.
