

What is Probability?

Probability is the measure of the likelihood of an event occurring. It is always a number between 0 and 1. If the probability of an event is 0, then it won't occur. If the probability of an event is 1 then it is certain to occur. For anything in between, there is no certainty whether or not it will occur, just a chance that it will.

Probability Applications

Sometimes, we know in advance the probability of an event. For example, if we were to roll a die, we know ahead of time that any one of the six numbers has an equal chance of appearing face up, assuming we have a fair die. So, if we define our event as "a 5 appears," then the probability of that event is $1/6$, or .17, or 17%. This is an example of a probability application because we know the exact makeup of the entire population. The probabilities describe the population (descriptive statistics).

Statistical Applications

Often we don't know the exact makeup of the population. We can't know ahead of time the likelihood of an event, so it has to be calculated by observation. We observe that a particular event occurs with a certain frequency over time. We can now calculate the probability by using the relative frequency formula: f/n . This is an example of a statistical application. We are using a sample to draw conclusions about what might happen with an unknown population (inferential statistics).

It's important to make a distinction between the probability of an event, and the actuality of the event.

Let's say that, historically, 35% of all freshman college students in the Fall semester seek help from their advisor. The 35% represents the relative frequency (35 out of every 100 students). The 35% also represents the probability that any particular student will seek help. Will a particular student seek help? Maybe; maybe not. That's one difference between the probability and the actuality.

If there are 1000 freshman students, we could predict that 350 (35% of 1000) will seek help. The college makes sure to staff with enough advisors to help 350 students. Will exactly 350 students seek help? Not likely. However, we may get close to that.

False Positives and False Negatives

	Test indicates condition	Test does not indicate condition
Person has condition	True Positive	False Negative
Person does not have condition	False Positive	True Negative