

5.2.2: Types of Probability

Classical probability (also called Mathematical Probability) is determined by counting or by using a mathematical formula or model.

Example



The probability of getting a "Heads" when tossing a fair coin is 0.5 or 50%. The probability of rolling a 5 on a fair six-sided die is $1/6$, since all numbers are equally likely.

Empirical probability is based on the relative frequencies of historical data, studies or experiments.

Example

The probability that Stephen Curry make a free throw is 90.8% based on the frequency of successes from all prior free throws.

The probability of a random student getting an A in a Statistics class taught by Professor Nguyen is 22.8%, because grade records show that of the 1000 students who took her class in the past, 228 received an A.

In a study of 832 adults with colon cancer, an experimental drug reduced tumors in 131 patients. The probability that the experimental drug reduces colon cancer tumors is $131/832$, or 15.7%.

Subjective probability is a “one-shot” educated guess based on anecdotal stories, intuition or a feeling as to whether an event is likely, unlikely or “50-50”. Subjective probability is often inaccurate.

Example

Although Robert is nervous about retaking the Statistics course after dropping the prior quarter, he is 90% sure he will pass the class because the website ratemyprofessor.com gave the instructor very positive reviews.

Jasmine believes that she will probably not like a new movie that is coming out soon because she is not a fan of the actor who is starring in the film. She is about 20% sure she will like the new movie.

No matter how probability is initially derived, the laws and rules of probability will be treated the same.

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