

Pointers Section 5.1

The probability of an event is a measure of how likely it is that the event occurs.

- The probability of an event is always between 0 (0%) and 1 (100%).
- If the probability of an event is 0, that means the event is an impossible event.
- If the probability of an event is 1, that means the event is a guaranteed event.

If a probability of an event is estimated to be 0 through experimental (empirical) evidence that does not mean that the event is impossible.

A **probability model** is a listing of all possible outcomes along with their respective probabilities. (You can think of it like a frequency distribution for probabilities.)

- In a probability model, the sum of all the probabilities must equal 1.
- In a probability model, no probability can be negative and no probability can be greater than 1.

Empirical probabilities: If you repeat an experiment “y” times and are successful “x” times, then the probability of success = x/y . In the long run, this can be interpreted as “If we repeat this experiment y times, we can expect x of those trials to be successes.”

For example, if an exam is given to 200 students and 179 of those students passed, we can say that the probability of passing the test is $179/200$ **AND** if we repeat this experiment 200 times we can expect approximately 179 students to pass the test.

The probability of an event occurring is equal to the percentage of time that the event occurs in the population.

Example: If 60% of COS students are female, the probability that any randomly selected student is female is 60% or 0.6.

If you have a decimal probability, you can interpret that long run probability by thinking of the decimal as a fraction.

- Probability = 0.23: 23 out of 100 times
- Probability = 0.316: 316 out of 1000 times

To change a frequency distribution to a probability model, simply convert it to a relative frequency distribution by dividing each frequency by n. (Watch MML for directions on the number of decimal places that should be in your answer.)

$P(A)$: Probability of event A occurring.

S : Sample Space (Listing of all possible outcomes)

$n(A)$: Number of ways event A can occur

$n(S)$: Number of possible outcomes in the sample space

Classical Probability – We use the following formula only when we know that each outcome is equally likely.

To compute $P(A)$, divide $n(A)$ by $n(S)$.

Be sure that all of your answers are in lowest terms.

An event is **unlikely** only if it has a probability that is below 0.05 or 5%.