

Probability Review: The Basics

Skills:

- Construct the sample space for a random experiment
 - Calculate simple, compound and conditional probabilities
 - Determine if events are independent
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Definitions

(Random) Experiment: some activity whose outcome is subject to chance

Outcome: the result of one trial of an experiment

Trial: one attempt of an experiment

Event: a group of outcomes that are related in some way

Universe: the set of all outcomes. Also known as the Sample Space

Another Definition

The **Probability of an Event** is the ratio of outcomes in the event to outcomes in the universe
Another way to say this is that if you repeat the experiment a lot(!), then the probability of the event is the proportion of attempts that resulted in the event
(this is the **Law of Large Numbers**)

Caution

In order for this definition of probability to work,
you must be **specific** when listing the universe
*For example...what's the universe when you roll
two dice?*

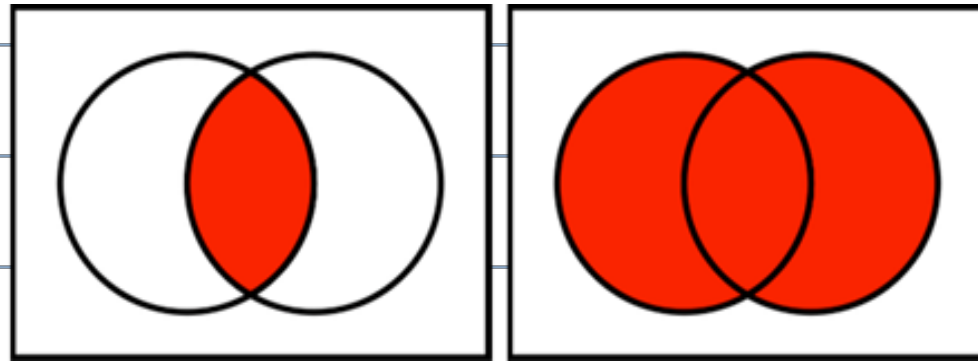
Mutually Exclusive

This is when two events **do not** have an intersection

They cannot happen at the same time

Union

The **Union** of events A and B contains all outcomes that belong to either (or both) of the events



Calculating Probability

If two events are mutually exclusive, then the probability of the union is just the sum of the individual probabilities

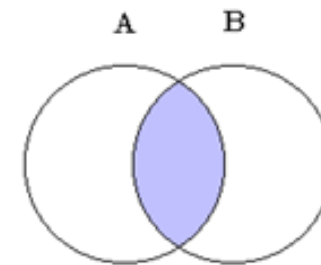
If they aren't mutually exclusive, then adding the individual probabilities will be too large
...how much larger?

Intersections

The Intersection of events A and B contains all outcomes that belong to both A and B

The Probability of the Intersection of events A and B is the probability that events A and B will happen at the same time

To find the probability...multiply.



Conditional Probability

The probability that event A **will** happen, given that event B **has already** happened

$P(A | B)$

You must read the questions carefully to know what has been **given**

Calculating Conditional Probability

The “given” changes the universe

The regular definition of probability still holds!

Independence

Two events are **independent** if knowing that one *has happened* will have no effect on the probability that the other *will happen*

The following probabilities must be equal for two events to be independent:

$$P(A) = P(A, \text{ given } B)$$

Example

		Identified Tap Water?		
		Yes	No	Total
Drinks Bottled Water?	Yes	24	6	30
	No	36	34	70
	Total	60	40	100