# Probability Summary Sheet

$$\text{Probability} = \frac{\text{\# outcomes corresponding to that event}}{\text{total \# of outcomes}}$$

Prob. $= 1 \rightarrow$ event is certain to occur
Prob. $= 0 \rightarrow$ event is certain to NOT occur

The sum of all the probabilities is *always* equal to one, in other terms:

$$1 = \sum_i \Pr(i)$$

$\cup$ denotes union – often said as "or"
$\cap$ denotes intersection – often said as "and"

## Adding Probabilities

*Disjoint* – When two events are not related to one another, one event will not occur if the other does.

When events are disjoint:

$$\Pr(A \text{ or } B) = \Pr(A \cup B) = \Pr(A) + \Pr(B)$$

When events are not disjoint:

$$\Pr(A \cup B) = \Pr(A) + \Pr(B) - \Pr(A \cap B)$$

## Probability Distributions

*Uniform* – All outcomes are equally likely
*Non-Uniform* – Some outcomes are more likely than others

## Estimating Distributions

Repeat trials of random events, over a large number of trials, will approximately yield the true distribution. (*See Module 1 part 3.3 for interactive example*)