

# Experimental / Theoretical Probability

- outcome  $\rightarrow$  result
- sample space  $\rightarrow$  total # of outcomes

$$P(\text{event}) = \frac{\# \text{ of desired outcomes}}{\# \text{ of TOTAL outcomes}}$$

$$\underline{\text{EX}} \rightarrow P(\text{ace}) = \frac{4}{52} = \frac{1}{13}$$

$$\underline{\text{EX}} \rightarrow P(\text{face card}) = \frac{16}{52} = \frac{4}{13}$$

$\downarrow$   
Ace, King, Queen, Jack

- Experimental probability  $\rightarrow$  probability after running trials

EX  $\rightarrow$  Cancer drug was found to be 98% effective in clinical trials. What is the probability it is successful for a random patient?

$$P(\text{success}) = \frac{98}{100} = \frac{49}{50} = 0.98$$

- Theoretical probability  $\rightarrow$  probability based on "math"

EX  $\rightarrow$  cards from a deck, rolling a die

EX  $\rightarrow$  Chances of rolling a sum of 6 from 2 die

	1	2	3	4	5	6
1	2	3	4	5	6	7
2	3	4	5	6	7	8
3	4	5	6	7	8	9
4	5	6	7	8	9	10
5	6	7	8	9	10	11
6	7	8	9	10	11	12

2	3	4	5	6	7	8	9	10	11	12
1	2	3	4	5	6	5	4	3	2	1

$$\frac{5}{36}$$

- Probability always between 0 & 1

- Complement  $\rightarrow$  chance event does NOT happen

$$\hookrightarrow P(\text{NOT event}) = 1 - P(\text{event})$$

$$\hookrightarrow \text{Complement of } A = A^c$$

EX  $\rightarrow$  30% chance of rain  $\rightarrow$  chance of NO rain?

$$P(\text{NO rain}) = 1 - 0.3 = 0.7 \Rightarrow 70\%$$

HW : p. 827 → 7-27