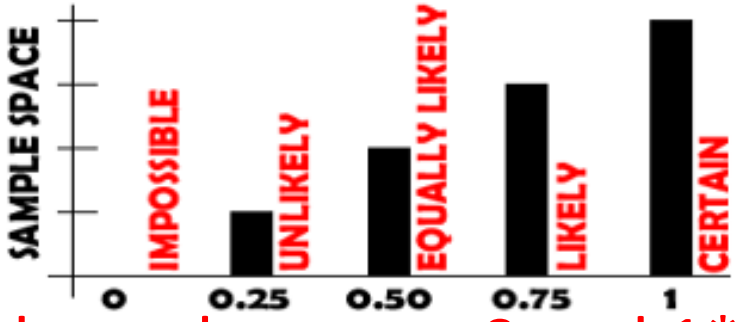
Probability – Day 1

IC2

What is probability? How is it calculated?

Chance of an event

$$P = \frac{\text{Number of successful outcomes}}{\text{Total number of outcomes}}$$



Always between 0 and 1

1. Determine which of the following are valid values for probability.

a) P(A) = 0.4

Valid or Invalid

b) P(B) = $\frac{7}{3}$

Valid or Invalid

c) P(C) = 100

Valid or Invalid

d) P(A) = $\frac{4}{5}$

Valid or Invalid

2. Determine the probability of each event and then determine if the events are: (I)mpossible, (UN)likely, (EQ)ually likely, (L)ikely or (C)ertain to happen.

a) Selecting a red marble from a bag of 5 red & 2 green marbles.

$$\frac{5}{7}$$

I or UN or EQ or L or C

b) Selecting a spade from a deck of cards.

$$\frac{13}{52} = \frac{1}{4}$$

I or UN or EQ or L or C

c) Selecting a green marble from a bag of 5 red & 2 green marbles.

$$\frac{2}{7}$$

I or UN or EQ or L or C

d) Getting a head when flipping a coin.

$$\frac{1}{2}$$

I or UN or EQ or L or C

3. A Bag of marbles has 4 yellow, 5 red, and 1 purple. Create a situation that would satisfy the following:

a) Something that is IMPOSSIBLE to happen.

*choosing an orange marble

b) Something that is EQUALLY LIKELY to happen.

*choosing a red marble
*Not choosing a red marble
*choosing a yellow or purple marble

c) Something that is LIKELY to happen.

*Not choosing purple

*choosing a yellow or red

4. Describe a NEW situation that would satisfy the following: (Do not use something mentioned above.)

a) Something that is UNLIKELY to happen.

b) Something that is EQUALLY LIKELY to happen.

c) Something that is IMPOSSIBLE to happen.

(ME)
MUTUALLY EXCLUSIVE EVENTS: Events that have No outcomes in common
(can't happen at same time)

(NME)
NON-MUTUALLY EXCLUSIVE EVENTS: Events that have outcomes in common
(could happen at same time)

5. Determine whether the event described are mutually exclusive (ME) or non-mutually exclusive (NME).

a) Rolling a 2 or a 6 on a die.

MUTUALLY EXCLUSIVE NON-MUTUALLY EXCLUSIVE

b) Rolling an even number or a 4 on a die.

MUTUALLY EXCLUSIVE NON-MUTUALLY EXCLUSIVE

c) Choosing a bird or a pet.

MUTUALLY EXCLUSIVE NON-MUTUALLY EXCLUSIVE

d) Choosing a senior student or a junior student.

MUTUALLY EXCLUSIVE NON-MUTUALLY EXCLUSIVE

e) Drawing a heart or a club.

MUTUALLY EXCLUSIVE NON-MUTUALLY EXCLUSIVE

f) Drawing an ace or a black card.

MUTUALLY EXCLUSIVE NON-MUTUALLY EXCLUSIVE

Addition Rule for Probability	
Mutually Exclusive Events: $P(A \text{ or } B) = P(A) + P(B)$	**Non-Mutually Exclusive Events:** $P(A \text{ or } B) = P(A) + P(B) - \underbrace{P(A \text{ and } B)}$ Gets rid of the fact that some outcomes were counted twice.

5. Determine the probability. Be careful to determine whether the events are mutually exclusive when needed.

a) Given a bag of marbles with 2 green, 3 yellow and 5 red, what is the: (10 total)

P(Green) = $\frac{2}{10} = \frac{1}{5}$ P(Red) = $\frac{5}{10} = \frac{1}{2}$ P(green or red) = $\frac{2+5}{10} = \frac{7}{10}$

b) Given a standard deck of cards, what is the : (52 total)

P(Diamond) = $\frac{13}{52} = \frac{1}{4}$ P(Jack) = $\frac{4}{52} = \frac{1}{13}$ P(Numerical Card) = $\frac{36}{52} = \frac{9}{13}$

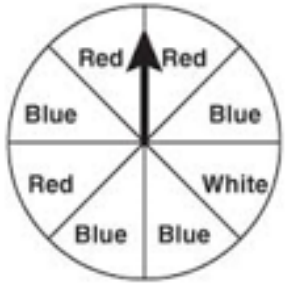
P(Ace or 5) = $\frac{4+4}{52} = \frac{2}{13}$ P(Face Card or Black Card) = $\frac{12+26-6}{52} = \frac{8}{13}$ P(8 or a heart) = $\frac{16}{52} = \frac{4}{13}$

12 26 4 13

But 6 of face cards are black (NME) But 1 8 is a heart (NME)

c) Given the spinner, what is the:

8 equal outcomes



P(Red) = $\frac{3}{8}$

P(White) = $\frac{1}{8}$

P(Green) = $\frac{0}{8} = 0$

P(Blue or Red) = $\frac{7}{8}$

Anything but white/no sections are both → ME

d) Given the spinner, what is the:

P(number divisible by 3) = $\frac{6}{12} = \frac{1}{2}$

P(a factor of 12) = $\frac{4}{12} = \frac{1}{3}$

P(number greater than 10) = $\frac{4}{12} = \frac{1}{3}$

P(factor of 10) = $\frac{2}{12} = \frac{1}{6}$

P(multiple of 3 or an odd number) = $\frac{10}{12} = \frac{5}{6}$

6 7

But 3 are both (NME)

P(odd number or a 6) = $\frac{8}{12} = \frac{2}{3}$

7 1

None are both (ME)

{0, 1, 3, 5, 6, 7, 8, 9, 11, 12, 15, 18}