Probability (Unit 9) – Day 4: Mutually Exclusive and Inclusive Events Name: Ms. Malus

Mutually Exclusive Events

Suppose you are rolling a six-sided die. What is the probability that you roll an odd number or you roll a 2?

- Can these both occur at the same time? Why or why not?

NO!, 2 is a even #

Mutually Exclusive Events:

Two events that cannot occur at the same time.

$P(A \cap B) = 0$

- The probability of two mutually exclusive events occurring at the **same time**, P(A and B), is 0

To find the probability of one of two **mutually exclusive** events occurring, use the following formula:

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

Examples:

1. If you randomly chose one of the integers 1 – 10, what is the probability of choosing either an odd number or an even number?

   Are these mutually exclusive events? Why or why not? yes, can't be even & odd at the same time

   Complete the following statement: P(odd or even) = P(O) + P(E)

   Now fill in with numbers: P(odd or even) = 5/10 + 5/10 = 10/10 = 1

   Does this answer make sense? yes, b/c all #s b/w 1-10 are EVEN OR ODD

2. Two fair dice are rolled. What is the probability of getting a sum less than 7 or a sum equal to 10?

   Are these events mutually exclusive? yes, b/c 10 cannot be < 7.

   Sometimes using a table of outcomes is useful. Complete the following table using the sums of two dice:

36 total outcomes

Roll a...	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

P(getting a sum less than 7 OR sum of 10) = P(7) + P(10)

$\frac{15}{36} + \frac{3}{36} = \frac{18}{36} = \frac{1}{2} = .5$ 50%

Mutually Inclusive/Exclusive Events

Name: _____

Mutually Inclusive Events

ODD {1,3,5} < 4 {1,2,3}

Suppose you are rolling a six-sided die. What is the probability that you roll an odd number or a number less than 4?

- Can these both occur at the same time? If so, when?

yes, when rolling a 1 or 3

Mutually Inclusive Events:

Two events that can happen at the same time (overlap)

Probability of the Union of Two Events: The Addition Rule:

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

... Must subtract the overlap! ...

Examples: *Mutually Exclusive: $P(A \cap B) = 0$ *

1. What is the probability of choosing a card from a deck of cards that is a club or a ten?

P(choosing a club or a ten) = $P(\clubsuit) + P(10) - P(10\clubsuit)$

$$\frac{13}{52} + \frac{4}{52} - \frac{1}{52} = \frac{16}{52} = .3077$$

2. What is the probability of choosing a number from 1 to 10 that is less than 5 or odd?

$P(<5 \text{ or } ODD) = P(<5) + P(ODD) - P(\text{both})$

$4/10 + 5/10 - 2/10 = 7/10$

3. A bag contains 26 tiles with a letter on each, one tile for each letter of the alphabet. What is the probability of reaching into the bag and randomly choosing a tile with one of the first 10 letters of the alphabet on it or randomly choosing a tile with a vowel on it?

$\frac{10}{26} + \frac{5}{26} - 3/26 = 12/26$ .4615

ABCDEFGHIJ

4. A bag contains 26 tiles with a letter on each, one tile for each letter of the alphabet. What is the probability of reaching into the bag and randomly choosing a tile with one of the last 5 letters of the alphabet on it or randomly choosing a tile with a vowel on it?

$$\frac{5}{26} + \frac{5}{26} - \frac{0}{26} = \frac{10}{26} = .3846$$

* Mutually Exclusive *

VWXYZ