

Sec 6.5 – Applications of Probability
Mutually Exclusive & Inclusive

Name: _____

Two events that have NO outcomes in common are called **mutually exclusive** (i.e. they cannot occur at the same time)
Here are some examples:

- **Taking a M/C test by guessing:** The outcomes **getting the #1 correct** and **getting # 1 wrong** are Mutually Exclusive
- **Drawing a card from a standard deck:** The outcomes **Ace** and **Numbered Cards** are Mutually Exclusive
- **Rolling a die:** The outcomes **Even number** and **Odd number** are Mutually Exclusive.

Two events that have outcomes in common are sometimes referred to as **inclusive** (i.e. they can occur at the same time)
Here are some examples:

- **Taking a M/C test by guessing:** The outcomes **getting the #1 correct** and **getting # 2 wrong** are Inclusive.
- **Drawing a card from a standard deck:** The outcomes **Ace** and **Red Card** are Inclusive.
- **Rolling a die:** The outcomes **Even number** and **Number greater than 3** are Inclusive.

For both mutually exclusive and inclusive events the addition rule can be applied:

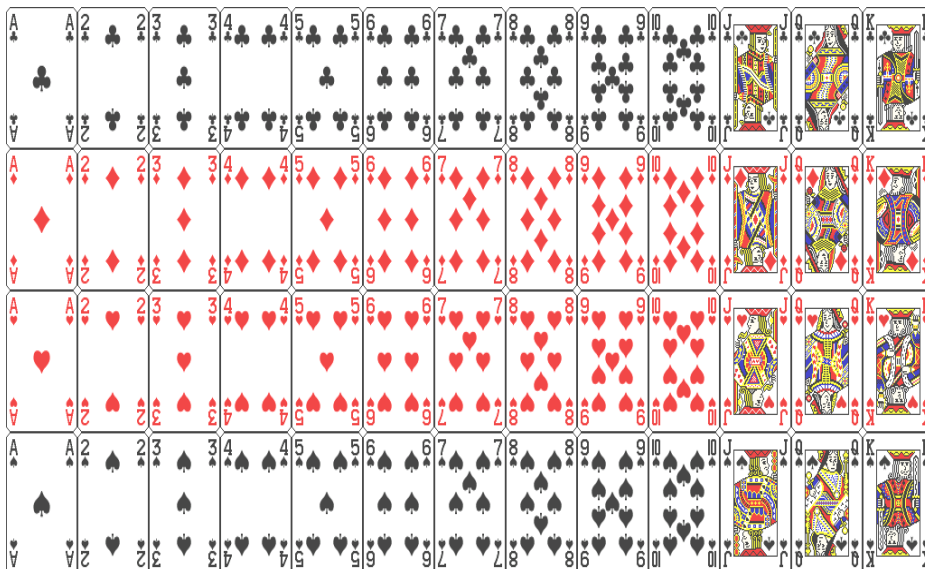
- **$P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$**

1. What is the probability of randomly selecting a card from a standard 52 card deck and having the card be a **black card** or a **face card**?

Circle one of the following:

Mutually Exclusive Inclusive

Reduced Fraction:



2. What is the probability of randomly selecting a card from a standard 52 card deck and having the card be a **face card** or an **odd numbered card**?

Circle one of the following:

Mutually Exclusive Inclusive

Reduced Fraction:

3. What is the probability of randomly selecting a card from a standard 52 card deck and having the card be an **even card** or **red numbered card**?

Circle one of the following:

Mutually Exclusive Inclusive

Reduced Fraction:

4. What is the probability of randomly selecting a card from a standard 52 card deck and having the card be a **heart with a number on it** or a **spade with a letter on it**?

Circle one of the following:

Mutually Exclusive Inclusive

Reduced Fraction:

5. The following shows a VENN diagram with the results of a survey a teacher gave to all of her students. It represents where all of the students have gone to eat over the last month. What is the probability of the following?

- i. What is the probability of randomly selecting a person from this group and picking a student that has **NOT eaten at any of the restaurants** OR they ate at **McDonald's**?

Circle one of the following:

Mutually Exclusive Inclusive

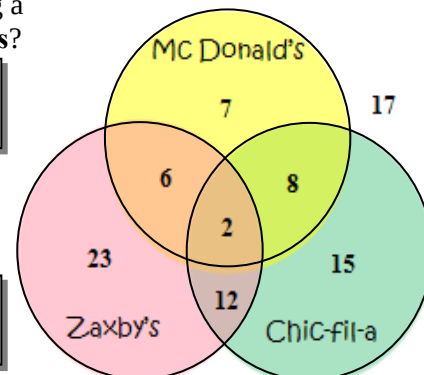
Reduced Fraction:

- ii. What is the probability of randomly selecting a person from this group and picking a student that has eaten at **McDonald's** OR **Chick-fil-a**?

Circle one of the following:

Mutually Exclusive Inclusive

Reduced Fraction:



6. What is the probability of rolling two dice and having getting a sum of 4 OR getting a sum greater than 10?

Circle one of the following:

Mutually Exclusive Inclusive

Reduced Fraction:

7. What is the probability of rolling two standard number cubes to a sum that is even or a sum that is greater than 9?

Circle one of the following:

Mutually Exclusive Inclusive

Reduced Fraction:

	1	2	3	4	5	6
1	(1,1)	(1,2)	(1,3)	(1,4)	(1,5)	(1,6)
2	(2,1)	(2,2)	(2,3)	(2,4)	(2,5)	(2,6)
3	(3,1)	(3,2)	(3,3)	(3,4)	(3,5)	(3,6)
4	(4,1)	(4,2)	(4,3)	(4,4)	(4,5)	(4,6)
5	(5,1)	(5,2)	(5,3)	(5,4)	(5,5)	(5,6)
6	(6,1)	(6,2)	(6,3)	(6,4)	(6,5)	(6,6)

8. Consider the VENN diagrams at the right to help you answer the following.

A. $P(A) =$

Decimal:

F. $P(C) =$

Decimal:

B. $P(A \text{ and } B) = P(A \cap B) =$

Decimal:

G. $P(C \text{ and } D) = P(C \cap D) =$

Decimal:

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

Decimal:

H. $P(C \text{ or } D) = P(C \cup D) =$

Decimal:

D. $P(A^c) = P(A') =$

Decimal:

I. $P(C^c) = P(C') =$

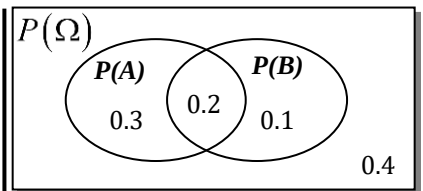
Decimal:

E. $P(A \text{ and } B^c) = P(A \cap B') =$

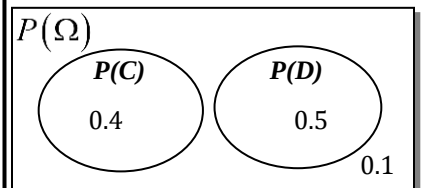
Decimal:

J. $P(C^c \text{ and } D^c) = P(C' \cap D') =$

Decimal:

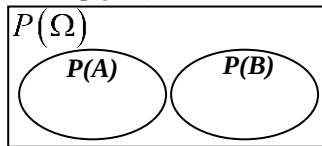
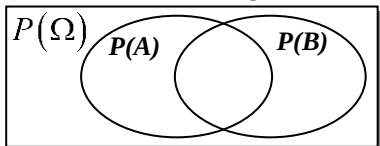


A and B are inclusive events.



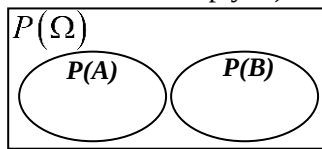
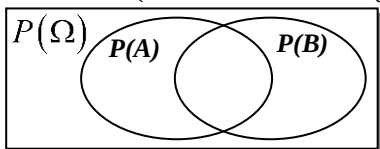
C and D are disjoint events.

9. Given, $P(A) = 0.5$, $P(B) = 0.4$, determine the probability of $P(A \text{ and } B)$ if the two events are **mutually exclusive** (use either of the diagrams below to help you).



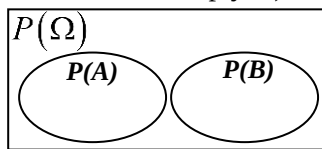
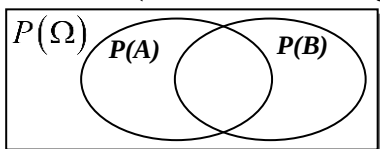
Decimal:

10. Given, $P(A) = 0.4$, $P(B) = 0.3$, $P(A \text{ and } B) = 0.1$, determine the probability of $P(A \text{ or } B)$ if the two events are **inclusive** (use either of the diagrams below to help you).



Decimal:

11. Given, $P(A) = 0.5$, $P(B) = 0.3$, $P(A \text{ or } B) = 0.6$, determine the probability of $P(A \text{ and } B)$ if the two events are **inclusive** (use either of the diagrams below to help you)?



Decimal:

12. Jason asks each member of his class what type of phone they have. The class consists of 12 women and 8 men. 5 of the women said they had android based phones and 4 of the men said they had android based phones. What is the probability of randomly picking a student in the class that is a man or that does not own an android based phone?

Decimal: