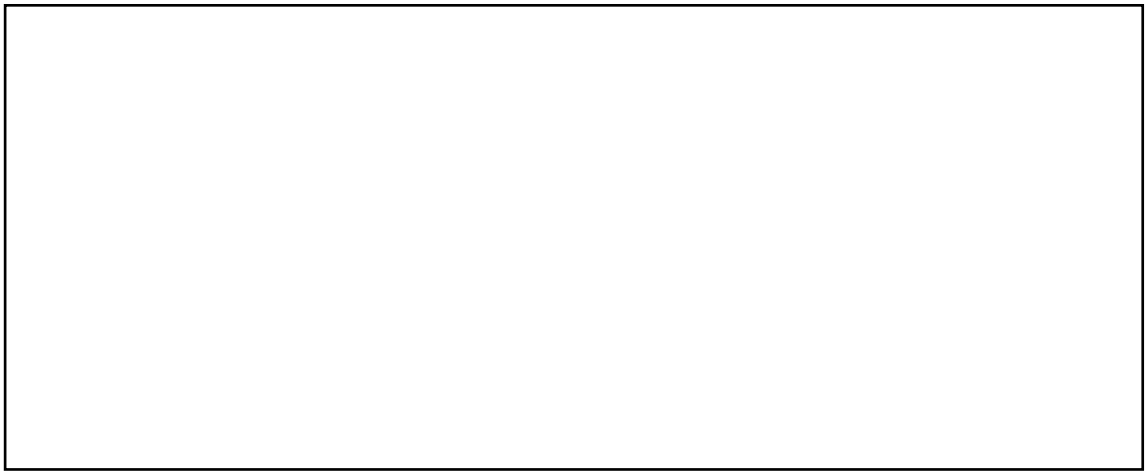
Foundations 12 – Mutually Exclusive Events

Homework: Lesson #3 on Pg. 123: #1-12

Warm-up

I polled the students in our class and got the following results. 53% of people said they liked cats, 69% said they liked dogs and 35% said they liked cats and dogs. Draw a Venn Diagram to figure out the probability that a person chosen at random:

i. likes just cats
ii. likes just dogs
iii. doesn't like cats or dogs
iv. likes cats or dogs



i. _____
ii. _____
iii. _____
iv. _____

Ex 1

A six-sided die is rolled. Let's call Event A "An even number is rolled" and Event B "An odd number is rolled"

a) List all the possible outcomes for:
   i. Event A
   ii. Event B
   iii. Event A or B (written Event A U B)
   iv. Event A and B (written Event A $\cap$ B)

b) Draw a Venn Diagram for the Sample Space and indicate where each event would go

c) Calculate the following probabilities

i. P(A) = ii. P(B) =

iii. P(A U B) = iv. P(A ∩ B) =

Since P(A ∩ B) = _____, we call Event A and Event B _____ _____.

Another way to see this: Since Event A and Event B do **not** overlap in the Venn Diagram, we

call the events _____ _____.

Ex 2

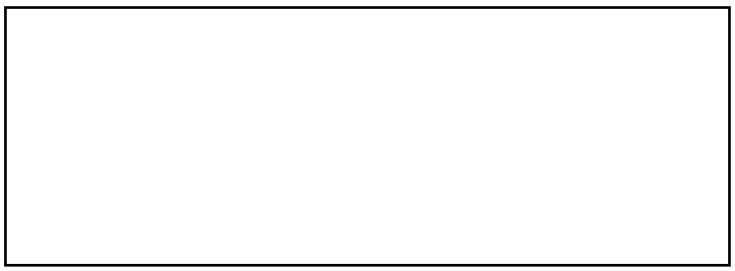
A six-sided die is rolled. Let's call Event A "An even number is rolled" and Event B "A multiple of 3 is rolled"

d) List all the possible outcomes for:

ii. Event A ii. Event B

iii. Event A or B (written Event A U B) iv. Event A and B (written Event A ∩ B)

e) Draw a Venn Diagram for the Sample Space and indicate where each event would go



f) Calculate the following probabilities

ii. P(A) = ii. P(B) =

iii. P(A U B) = iv. P(A ∩ B) =

Since P(A ∩ B) ≠_____, Event A and Event B are **not** _____ _____.

Another way to see this: Since Event A and Event B do overlap in the Venn Diagram, we know

the events are **not** _____ _____.

The ways to check if two events are mutually exclusive:

1. Think about the probability: $P(A \cap B)$. Is it possible for Event A and Event B to happen at the same time? If yes, then they are _____

2. If they don't overlap in a Venn Diagram, then they are_____

Ex 3 Are the following events mutually exclusive?

a) You draw a card from a standard deck
Event A - A face card is selected Event B – A club is selected

b) You roll two 6-sided dice
Event A – Both dice show the same number Event B – The dice add to 9

Ex 4

For each experiment below, think of two events that are **mutually exclusive** and two events that are **NOT mutually exclusive**.

a) Drawing a card from a standard deck

i. Two mutually exclusive events

_____

_____

ii. Two **Not** mutually exclusive events

_____

_____

b) Rolling a 20 sided die (D20)

ii. Two mutually exclusive events

_____

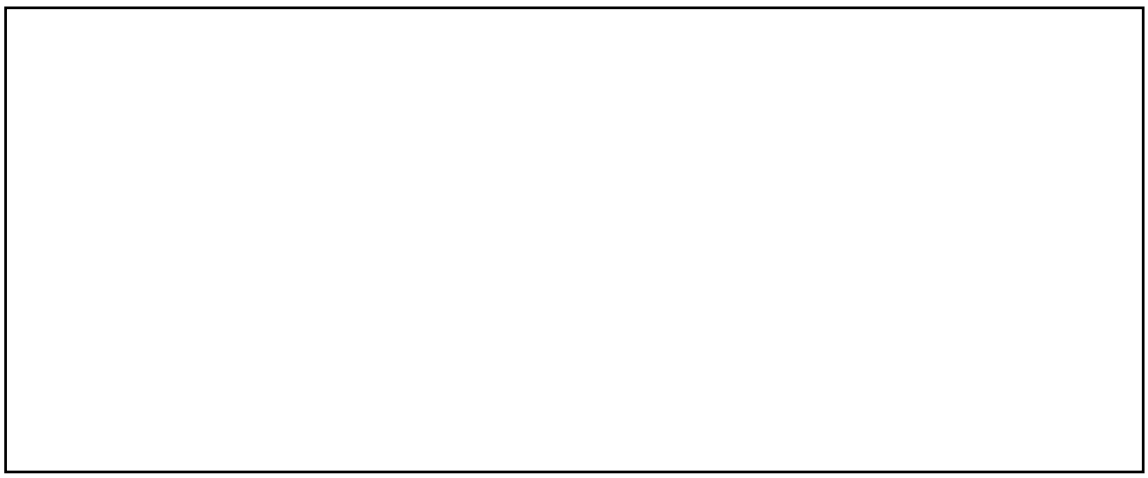
_____

ii. Two Not mutually exclusive events

_____

_____

There is a formula we can use that calculates P(A U B): Let's look back at the warm-up



P (A U B) =

Let's check that the formula works for **Warm-up**, **Ex 1** , and **Ex 2** from before:

Check **Warm-up**

Check **Ex 1**

Check **Ex 2**