

House of Representatives					
Political party					
		Republican	Democrat	Independent	Total
Gender	Male	213	142	0	355
	Female	19	58	0	77
	Total	232	200	0	432

Senate					
Political party					
		Republican	Democrat	Independent	Total
Gender	Male	41	37	2	80
	Female	4	16	0	20
	Total	45	53	2	100

Station 1

Find the probability that a randomly selected representative is female. Find the probability that a randomly selected senator is female.

Compare the probabilities from Exercise 1.

Even though it seems there are way more women

In House the prob are very similar and actually there are more 76% of women in senate

$= .178$

$= .20$

Rep

$P(\text{Female}) = \frac{77}{432}$

$P(\text{Female}) = \frac{20}{100}$

Station 2

A representative is selected at random. Find the probability of each event.

The representative is male.

The representative is a Republican.

The representative is male given that the representative is a Republican.

The representative is female and a Democrat.

Are the events "being female" and "being a Democrat" independent or dependent events? Explain.

$P(M) = \frac{355}{432}$
 $P(R) = \frac{232}{432}$

$P(M|R) = \frac{213}{232}$

$P(F \cap D)$

Rep

$P(\text{Male}) = \frac{355}{432}$

$P(\text{Rep}) = \frac{232}{432}$

$P(\text{Male} | \text{Rep}) = \frac{213}{232}$

$P(\text{Female} \cap \text{Dem}) = P(\text{Fem}) \cdot P(\text{Dem} | \text{Fem})$

$\frac{77}{432} \cdot \frac{58}{77} = \frac{58}{432} = .134$

Independent

$P(A \cap B) \stackrel{?}{=} P(A) \cdot P(B)$

$\frac{58}{432} \neq \frac{77}{432} \cdot \frac{20}{432} = .083$

Not equal \therefore
 Not Independent

Station 3

A senator is selected at random. Find the probability of each event.

-) The senator is male. $P(M) = \frac{80}{100} = .8$
-) The senator is not a Democrat. $P(\text{Not Dem}) = 1 - P(\text{Dem}) = 1 - \frac{53}{100} = \frac{47}{100}$
-) The senator is female or a Republican. $P(F \text{ or } R) = P(F) + P(R) - P(F \cap R)$

The senator is male or a Democrat.

Are the events "being female" and "being an Independent" mutually exclusive? Explain.

$$P(M \text{ or } D) = P(M) + P(D) - P(M \cap D)$$

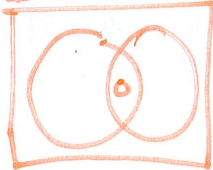
$$\frac{80}{100} + \frac{53}{100} - \frac{37}{100} = \frac{96}{100} = .96$$

$$\frac{20}{100} + \frac{45}{100} - \frac{4}{100} = \frac{61}{100}$$

Not M.E. →



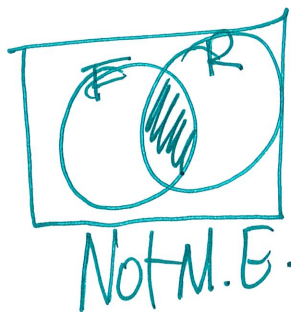
Even though in this data there are no female Independents, you can still be a female and Independent at the same time. So NOT MUTUALLY EXCLUSIVE.



Station 4

A senator is selected at random find the probability of each event

- a. $P(\text{Female} | \text{Republican}) = \frac{4}{45}$
- b. $P(\text{Female and Republican}) = P(F) \cdot P(R | F) = \frac{20}{100} \cdot \frac{4}{20} = \frac{4}{100} = .04$
- c. $P(F \text{ or } R) = P(F) + P(R) - P(F \cap R)$
 $\frac{20}{100} + \frac{45}{100} - \frac{4}{100} = \frac{61}{100} = .61$



Station 5

A student must choose from 7 classes to take at 8:00 A.M., 4 classes to take at 9:00 A.M., and 3 classes to take at 10:00 A.M. How many ways can the student arrange the schedule?

The state of Virginia's license plates have three letters followed by four digits. Assuming that any letter or digit can be used, how many different license plates are possible?

$$7 \cdot 4 \cdot 3 = 84 \text{ ways}$$

$$26 \cdot 26 \cdot 26 \cdot 10 \cdot 10 \cdot 10 \cdot 10$$

$$175,760,000$$



Station 6

In Exercises 19–21, determine whether the events are independent or dependent. Explain your reasoning.

- 19. Tossing a coin four times, getting four heads, and tossing it a fifth time and getting a head
- 20. Taking a driver's education course and passing the driver's license exam
- 21. Getting high grades and being awarded an academic scholarship
- 22. You are given that $P(A) = 0.35$ and $P(B) = 0.25$. Do you have enough information to find $P(A \text{ and } B)$? Explain.

Independent the coin doesn't remember it landed on heads.
 dependent
 dependent
 Not enough information because if independent

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

$$??? = (.35) \cdot (.25)$$



You don't know the probability of $P(A \text{ and } B)$ so you can't tell.

Station 7

In Exercises 25–27, determine whether the events are mutually exclusive. Explain your reasoning.

- 25. Event A: Randomly select a red jelly bean from a jar.
Event B: Randomly select a yellow jelly bean from the same jar.

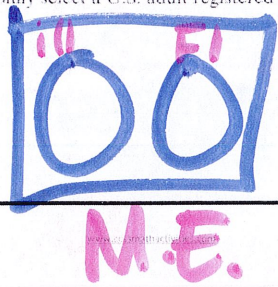
M.E.

- 26. Event A: Randomly select a person who loves cats.
Event B: Randomly select a person who owns a dog.

Not M.E.

- 27. Event A: Randomly select a U.S. adult registered to vote in Illinois.
Event B: Randomly select a U.S. adult registered to vote in Florida.

M.E.



Station 8

In Exercises 31–34, find the probability.

- 31. A card is randomly selected from a standard deck of 52 playing cards. Find the probability that the card is between 4 and 8, inclusive, or is a club.
- 32. A card is randomly selected from a standard deck of 52 playing cards. Find the probability that the card is red or a queen.
- 33. A 12-sided die, numbered 1 to 12, is rolled. Find the probability that the roll results in an odd number or a number less than 4.
- 34. An 8-sided die, numbered 1 to 8, is rolled. Find the probability that the roll results in an even number or a number greater than 6.

$P(4, 5, 6, 7, 8 \text{ or Club})$

$$P(4, 5, 6, 7, 8) + P(\text{club}) - P(\text{4, 5, 6, 7, 8 and Club})$$

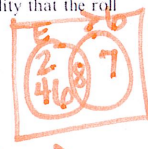
$$\frac{20}{52} + \frac{13}{52} - \frac{5}{52} = \frac{28}{52} = .538$$

1-8

$$P(\text{Even or } \# \text{ greater } 6)$$

$$P(\text{even}) + P(>6) - P(\text{Even } \& \text{ } >6)$$

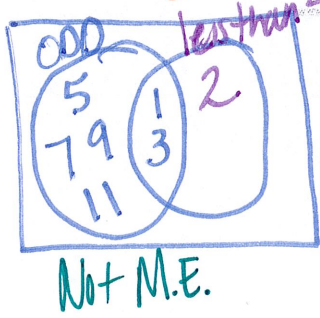
$$\frac{4}{8} + \frac{2}{8} - \frac{1}{8} = \frac{5}{8} = .625$$



$P(\text{Red or Queen})$

$$P(\text{Red}) + P(Q) - P(\text{Red Queen})$$

$$\frac{26}{52} + \frac{4}{52} - \frac{2}{52} = \frac{28}{52} = .538$$



33. $P(\text{odd or } \# \text{ less } 4) = P(\text{odd}) + P(\text{less } 4) - P(\text{odd } \& \text{ } < 4)$

$$\frac{6}{12} + \frac{3}{12} - \frac{2}{12} = \frac{7}{12} = .583$$