

HW 12-4 tonight is 3 pages!

HW 12-3

1. a) See table on work slide. b) .600 or 60%
c) .444 or 44.4% d) .727 or 72.7%
e) Answers will vary. Yes, there is a significantly greater probability that a dog passed the obedience class if a dog is small rather than large.
f) Answers will vary. No, large dogs are less likely to have passed the obedience class as small dogs.
2. a) A randomly selected student is not male. (Is female)
b) A randomly selected student does not participate in a school club.
c) A randomly selected student is male or participates in a school club.
d) A randomly selected student is male and participates in a school club.
e) Female or does not participate in a school club.
f) Male and does not participate in a school club.
3. a) .450 b) .250 c) .550 d) .750 e) .600 f) .100

Alg 2 HW 12-3

1. *Obedience School for Dogs* is a small franchise that offers obedience classes for dogs. Some people think that larger dogs are easier to train and, therefore, should not be charged as much for the classes. To investigate this claim, dogs enrolled in the classes were classified as large (30 pounds or more) or small (under 30 pounds). The dogs were also classified by whether or not they passed the obedience class offered by the franchise. 45% of the dogs involved in the classes were large. 60% of the dogs passed the class. Records indicate that 40% of the dogs in the classes were small and passed the course.

a. Complete the following hypothetical 1000 two-way table.

	Passed the course	Did not pass the course	Total
Large Dogs	200	250	450
Small Dogs	400	150	550
Total	600	400	1000

b. Estimate the probability that a dog selected at random from those enrolled in the classes passed the course. $\frac{600}{1000}$ or .600 or 60%

c. A dog was randomly selected from the dogs that completed the class. If this was a large dog, what is the probability this dog passed the course?

$$\frac{200}{450} \text{ or } .444 \text{ or } 44.4\%$$

d. A dog was randomly selected from the dogs that completed the class. If this was a small dog, what is the probability this dog passed the course?

$$\frac{400}{550} \text{ or } .727 \text{ or } 72.7\%$$

e. Do you think dog size and whether or not a dog passes the course are related?

Answers will vary. Yes, there is a significant greater probability that a dog passed the obedience class if a dog is small rather than large.

f. Do you think large dogs should get a discount? Explain your answer.

Answers will vary. No, large dogs are less likely to have passed the obedience class as small dogs.

2. Students at Barnaby High School decided to investigate school club participation. The following completed hypothetical 1000 two-way table is part of their investigation.

	Yes - Participate in a school club	No - Do Not Participate in a school club	Total
Females	150	400	550
Males	100	350	450
Total	250	750	1000

Let "A" represent the event "a randomly selected student is male".

Let "B" represent the event "a randomly selected student participates in a school club".

Describe the following events in words:

- a. Not A. A randomly selected student is not male. (is female)
- b. Not B. A randomly selected student does not participate in a school club.
- c. A or B. A randomly selected student is male or participates in a school club.
- d. A and B. A randomly selected student is male and participates in a school club.
- e. Not A or Not B. Female or does not participate in a school club.
- f. A and Not B. Male and does not participate in a school club.

3. Based on the above descriptions and the completed table in #2, determine the probability of each of the following events as a fraction and a decimal (rounded to 3 decimal places):

a. A $\frac{450}{1000} = .450$

b. B $\frac{250}{1000} = .250$

c. Not A $\frac{550}{1000} = .550$

d. Not B $\frac{750}{1000} = .750$

e. A or B $\frac{450 + 150}{1000} = \frac{600}{1000} = .600$

f. A and B $\frac{100}{1000} = .100$

Day 4 Calculate Conditional Probability Using Two-Way Tables

Conditional Probability -

The probability of an event given that some other event occurs.

Mrs. James' brother used to live in Phoenix, AZ. He had a kitty cat door so his cat could come and go as she pleased. As many cats are, Boopy was an avid hunter. She would go out at night and bring home the treasures of her hunt - SNAKES! The snakes were dead or alive, poisonous or not poisonous. A hypothetical 1000 two-way table is below. (Table 4)

	Poisonous	Not Poisonous	Total
Dead	132	308	440
Alive	168	392	560
Total	300	700	1000

The notation for calculating a conditional probability is: $P(A \text{ given } B) = P(A | B) = \frac{P(A \cap B)}{P(B)}$

	Poisonous	Not Poisonous	Total
Dead	132	308	440

Suppose that a randomly selected snake is dead. What is the probability that the snake is poisonous? This probability is an example of what is called a **conditional probability**. This probability is calculated as the number of snakes who are poisonous AND dead divided by the total number of dead snakes.

1. The following are also examples of conditional probabilities. Answer each question with a fraction and a decimal (rounded to 3 decimal places).

- a. What is the probability that if a randomly selected snake is dead, it was poisonous?

$$P(P | \text{Dead}) = \frac{132}{440} = .300$$

- b. What is the probability that if a randomly selected snake is dead, it wasn't poisonous?

$$P(N.P | \text{Dead}) = \frac{308}{440} = .700$$

2. Describe two conditional probabilities that can be determined from the following row in Table 4.

$$P(P | \text{Alive})$$

- 1) What is the probability that if a randomly selected snake is alive, it was poisonous?
- 2) What is the probability that if a randomly selected snake is alive, it was not poisonous?

$$P(NP | \text{Alive})$$

	Poisonous	Not Poisonous	Total
Alive	168	392	560

3. Describe two conditional probabilities that can be determined from the following column in Table 4.

$$P(\text{Dead} | NP)$$

- 1) What is the probability that if a randomly selected snake is not poisonous, it was dead?
- 2) What is the probability that if a randomly selected snake is not poisonous, it was alive (not dead)?

$$P(\text{Alive} | NP)$$

	Not Poisonous
Dead	308
Alive	392
Total	700

Table 4: Snake Type (poison or not) by Alive or Dead

	Poisonous	Not Poisonous	Total
Dead	132	308	440
Alive	168	392	560
Total	300	700	1000

4. Determine the following conditional probabilities.

a. A randomly selected snake is dead.

What is the probability it is poisonous?

$$P(P|D) = 132/440 = .300$$

b. A randomly selected snake is alive.

What is the probability it is poisonous?

$$P(P|A) = 168/560 = .300$$

c. A snake is selected at random.

What is the probability the snake is poisonous?

$$P(P) = 300/1000 = .300$$

5. Based on the answers to Exercise 4, do you think dead snakes are more likely to be poisonous? Explain your answer.

No, the conditional probabilities of dead and alive snakes are equal. Dead snakes are just as likely to be poisonous as live snakes.

6. What do the probabilities tell us about the snakes brought in by Boopy?

The snakes, whether dead or alive, are equally likely to be poisonous. This means the events (a snake is dead and a snake is poisonous) are independent events. One does not influence the other. ~~More on this tomorrow.~~

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QUIZ

