

MA 110 TEST 3 REVIEW WORKSHEET

Name Solutions

1. A poll is conducted among the customers in a diner. The people are asked to state whether they would prefer a chicken (C) or beef (B) entrée, and which of the following sides they would prefer: rice (R), potatoes (P), or steamed veggies (S).

A. Write the sample space for this poll.

$$S = \{CR, CP, CS, BR, BP, BS\}$$

- B. List the outcomes which belong to the event $A =$ "the customer prefers chicken"

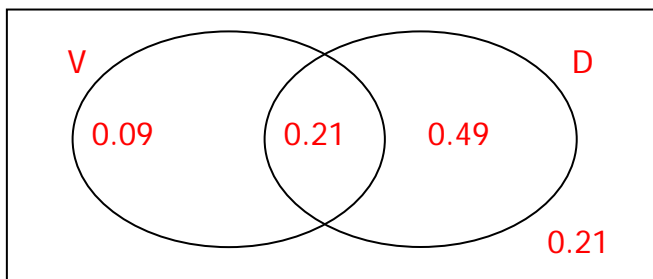
$$A = \{CR, CP, CS\}$$

- C. List the outcomes which belong to the event $B =$ "The customer prefers chicken and not rice"

$$B = \{CP, CS\}$$

2. In a certain town 70% of the people own dogs. Thirty percent of the people in the town are Vegetarians, and 21% of the vegetarians own dogs.

A. Draw a two-circle Venn Diagram using the information given.



B. What is the probability that a person is a vegetarian or owns a dog? 0.79 ($0.09 + 0.21 + 0.49$)

C. What is the probability that a person is a vegetarian, but does not own a dog? 0.09

D. What is the probability that a person is a vegetarian, given they own a dog? $0.21/0.7 = 0.3$

E. Are the events "person is a vegetarian" and "person owns a dog" independent? Use an appropriate calculation not intuition to answer.

$$\text{Yes, } P(V) = .3 = P(V|D) = 0.21/0.7 = 0.3$$

3. A shipment of 70 hand-held digital planners, including eight that are defective, is sent to a large electronics store.

A. If one planner is selected, what is the probability that it is defective? $8/70 = 0.114$

B. If five planners are selected, what is the probability that all five are defective?

$$\frac{C_{8,5}}{C_{70,5}} = \frac{56}{12,103,014} \approx 0.0000046 \text{ or } \frac{8}{70} \cdot \frac{7}{69} \cdot \frac{6}{68} \cdot \frac{5}{67} \cdot \frac{4}{66} = \frac{6720}{1,452,361,680} \approx 0.0000046$$

C. If five planners are selected, what is the probability that exactly three are defective?

$$\frac{C_{8,3} \cdot C_{62,2}}{C_{70,5}} = \frac{56 \cdot 1891}{12,103,014} = \frac{105,896}{12,103,014} \sim 0.009$$

D. If the original shipment of 70 hand-held digital planners, with 8 defective were representative of a larger batch of 4000 planners, how many planners would you expect to be defective in this larger batch of 4000?

$$(8/70)(4000) \sim 457 \text{ planners}$$

4. The odds of Americans living in the state in which they were born are 24 to 7. What is the probability that an American lives in the state in which he or she was born?

$$24/(24 + 7) = 24/31 = 0.77$$

5. The probability that a person wins a certain game is 11/32, what are the odds that the person wins the game?

$$11 \text{ to } 21 \qquad (32 - 11 = 21)$$

6. College students (245 students total) were given three choices of pizza toppings and asked to choose one favorite. The following table shows the results.

Toppings	Freshman F	Sophomore So	Junior J	Senior S
Cheese C	15	13	24	26
Meat M	27	26	13	15
Veggie V	18	15	27	26

What is the probability that the person selected

- A. is a freshman **or** chooses veggie as their favorite topping: $P(F \cup V)$
 $(15 + 27 + 18 + 15 + 27 + 26) / 245 \rightarrow 128/245$
- B. chooses veggie as their favorite topping: $P(V)$
 $(18 + 15 + 27 + 26) / 245 \rightarrow 86/245$
- C. is a freshman **and** chooses cheese as their favorite topping: $P(F \cap C)$
 $15 / 245$
- D. chooses **neither** Cheese **nor** veggie as their favorite topping: $P(C' \cap V')$ or $P((C \cup V)')$
 $(27 + 26 + 13 + 15) / 245 \rightarrow 81/245$
- E. is a freshman **given that** the person chooses veggie as their favorite topping: $P(F|V)$
 $18 / (18 + 15 + 27 + 26) \rightarrow 18/86$
- F. choose veggie as their favorite topping **given that** the person is a freshman: $P(V|F)$
 $18 / (15 + 27 + 18) \rightarrow 18/60$