

Name: \_\_\_\_\_

1. Environmental Protection Agency (EPA) fuel economy estimates for automobile models tested recently predicted a mean of 24.76 mpg and a standard deviation of 6.19 mpg for highway driving. Use the Empirical Rule to complete parts a) and b).
  - (a) (4 points) What percentage of autos get between 18.57 and 37.14 mpg?
    - a. 68%
    - b. 95%
    - c. 83.85%
    - d. 81.5%
  - (b) (4 points) Describe the gas mileage of the worst 2.5% of cars.
    - a. The worst 2.5% of cars get less 12.38 mpg.
    - b. The worst 2.5% of cars get more 12.38 mpg.
    - c. The worst 2.5% of cars get less 6.19 mpg.
    - d. The worst 2.5% of cars get less than 18.57 mpg.
2. (4 points) There are 3 different Mathematics courses, 5 different Science courses, and 4 different History courses. If a student must take one of each, how many different ways can this be done?
  - a. 12    b. 60    c. 15    d. 345
3. (4 points) Suppose that A, B are not mutually exclusive events, with  $P(A) = 0.2$  and  $P(B) = 0.7$  and  $P(A \text{ and } B) = 0.1$ . Find  $P(A \text{ or } B)$ .
  - a. 0.9    b. 0.8    c. 0.6    d. 0.1
4. (4 points) A basketball player hits three-point shots 64% of the time. If she takes 4 shots during a game, what is the probability that she misses the last three shots?
  - a. 0.03
  - b. 0.05
  - c. 0.5
  - d. 0.04

5. (4 points) License plates are made using 2 letters followed by 2 digits. How many plates can be made if repetition of letters is not allowed but repetition of digits is allowed?
- a. 650,000
  - b. 676,000
  - c. 468,000
  - d. none of the above
6. (4 points) If two cards are drawn at random without replacement from a standard deck, find the probability that the second card is red, given that the first card was a heart.
- a.  $1/13$
  - b.  $25/52$
  - c.  $24/51$
  - d.  $25/51$
7. (12 points) A survey of 20 students found that the number of books owned by each student was as follows:
- 10, 8, 12, 4, 9, 12, 10, 8, 2, 18, 9, 12, 11, 8, 0, 14, 5, 15, 10, 20
- Use this data to answer the following. Round answers to one decimal place.
- (a) Find the standard deviation of the data.
  - (b) Find the variance of the data.
  - (c) Find the 5 number summary.

(d) How many of these students are considered outliers with respect to number of books owned?

(e) Draw the boxplot.

8. (10 points) A test is given to a group of students; the grades and gender of the students is summarized in the table below:

|        | A  | B  | C  | Total |
|--------|----|----|----|-------|
| Male   | 8  | 17 | 10 | 35    |
| Female | 8  | 13 | 13 | 34    |
| Total  | 16 | 30 | 23 | 69    |

If one student is chosen at random, determine the following probabilities.

**Write your answer as fractions.**

- (a) What is the probability that the chosen student is a male?
- (b) What is the probability that the chosen student is a student who is female and got a C grade.
- (c) What is the probability that the chosen student is a male given the student got an A.
- (d) What is the probability that the chosen student is a female given the student got an A.

9. (10 points) A card is selected at random from a standard deck. **Write your answer as fractions.**

(a) Find probability of selecting a heart.

(b) Find probability of selecting the Queen of hearts.

(c) Find the probability of selecting a club **or** an Ace.

Standard deck

|     |     |     |     |
|-----|-----|-----|-----|
| 2♥  | 2♦  | 2♣  | 2♠  |
| 3♥  | 3♦  | 3♣  | 3♠  |
| 4♥  | 4♦  | 4♣  | 4♠  |
| 5♥  | 5♦  | 5♣  | 5♠  |
| 6♥  | 6♦  | 6♣  | 6♠  |
| 7♥  | 7♦  | 7♣  | 7♠  |
| 8♥  | 8♦  | 8♣  | 8♠  |
| 9♥  | 9♦  | 9♣  | 9♠  |
| 10♥ | 10♦ | 10♣ | 10♠ |
| J♥  | J♦  | J♣  | J♠  |
| Q♥  | Q♦  | Q♣  | Q♠  |
| K♥  | K♦  | K♣  | K♠  |
| A♥  | A♦  | A♣  | A♠  |

(a) Find the probability of selecting a face card **or** a 2.

(b) Find the probability of selecting a Jack **or** a high card.

10. (12 points) Let A, B be events, with  $P(A) = 0.4$ ,  $P(B) = 0.6$ , and  $P(A|B) = 0.20$ .

Calculate the following probabilities for parts a through d, and give your answer as a decimal rounded to two decimal places.

(a)  $P(B') =$

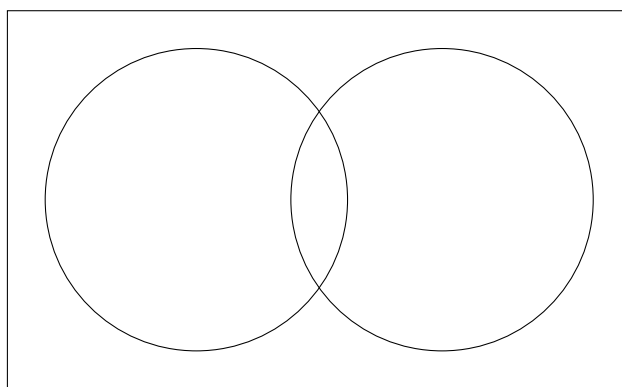
(b)  $P(A \text{ and } B) =$

(c)  $P(A \text{ or } B) =$

(d)  $P(B|A) =$

(e) Are events A and B independent? Justify your answer by showing what formula you used to decide on the answer.

11. (4 points) People with z-scores of 2.75 or above on a certain aptitude test are sometimes classified as geniuses. If aptitude test scores have a mean of 100 and a standard deviation of 8 points, what is the minimum aptitude test score needed to be considered a genius?
12. (12 points) Our survey found that 56% of college students live on campus, 62% have a campus meal program, and 42% do both.



- (a) What is the probability of picking a student who lives on campus but does not have a campus meal plan?
- (b) What's the probability that a chosen student lives off campus and does not have a campus meal?
- (c) What's the probability of picking a student who lives on campus or has a campus meal plan?
- (d) If you randomly select 3 students, what is the probability that all 3 live on campus?

(e) If you randomly select 3 students what is the probability that none have campus meal.

(f) *Bonus*: If you randomly select 4 students what is the probability that at least one lives on campus.

13. (12 points) A jar contains 8 red marbles, 10 blue marbles, and 4 white marbles. If two marbles are drawn randomly from the jar without replacement, find the probability of the given event, and write your answers as fractions.

(a) First, create a tree diagram with probabilities on each possible outcome.

(b) The second ball is red, given that the first ball is white:

(c) The second ball is white, given that the first ball is red:

(d) Both balls are white: