Exam 4 Test Prep

1. What is an experiment?

2. What is the sample space?

3. What is a simple event? Compound event?

4. What is the theoretical approach?

5. What is the empirical approach?

Now time to conduct an experiment!

    a) Using the theoretical approach, what <u>should</u> the probability/frequency be?

Roll the die 8 times, noting each time it is even/odd. Make it into a frequency table.

1	2	3	4	5	6	7	8

Even _____   **Odd** _____

b) Now for the table

Outcome	Frequency	Relative Frequency
total =		

6. Make a frequency distribution table, including Test Score Intervals, Frequency, and Relative Frequency, from the following data set of 20 quiz scores:
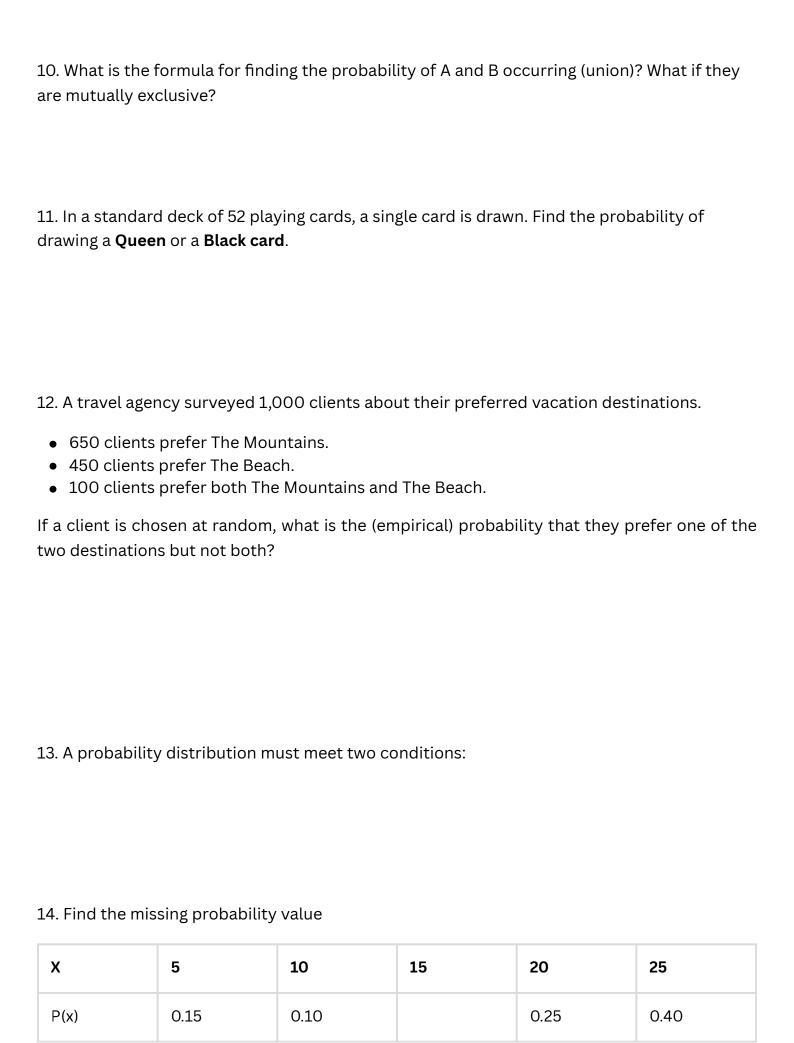
15, 22, 18, 25, 11, 19, 21, 14, 28, 17, 23, 10, 26, 16, 20, 24, 13, 27, 12, 29

Test Score Intervals	Frequency	Relative Frequency

7. What sign do we use for the union of A and B?

8. What sign do we use for the intersection of A and B?

9. How do we write the compliment of A?

10. What is the formula for finding the probability of A and B occurring (union)? What if they are mutually exclusive?

11. In a standard deck of 52 playing cards, a single card is drawn. Find the probability of drawing a **Queen** or a **Black card**.

12. A travel agency surveyed 1,000 clients about their preferred vacation destinations.

- 650 clients prefer The Mountains.
- 450 clients prefer The Beach.
- 100 clients prefer both The Mountains and The Beach.

If a client is chosen at random, what is the (empirical) probability that they prefer one of the two destinations but not both?

13. A probability distribution must meet two conditions:

14. Find the missing probability value

X	5	10	15	20	25
P(x)	0.15	0.10		0.25	0.40

15. What is the mean? Median? Mode?

16. The following data represents the number of daily visitors to a small art gallery over a period of 15 days:

42, 35, 48, 55, 38, 42, 51, 40, 35, 48, 45, 42, 50, 39, 48

Mean _____

Median _____

Mode _____

17. What is a population? What is the formula for population mean?

18. What is a sample? What is the formula for sample mean?

19. For each of the following scenarios, determine if the collected data represents a Population or a Sample.

Scenario 1: School Play Attendance

A local high school is planning its budget. They want to know the average number of students who attend the school play. They count the number of students at all 3 performances held this year.

Population or Sample?

Population:

Sample:

Scenario 2: Energy Drink Consumers

A large energy drink company wants to determine the average age of its consumers. They survey 1,000 people who purchased their product this week at a major grocery store chain across the country.

Population or Sample?

Population:

Sample:

Scenario 3: Factory Production Time

A factory wants to measure the time it takes to assemble a specific circuit board. They time every single one of the 200 circuit boards assembled during the night shift.

Population or Sample?

Population:

Sample:

20. The following data represents the daily commute times (in minutes) for 20 employees at a large company:

12, 18, 20, 24, 26, 30, 31, 35, 36, 39, 40, 42, 45, 48, 51, 53, 55, 59, 60, 64

Task: Construct a grouped frequency table using a class width of 10 and calculate the estimated mean.

Class Limit	Midpoint (x)	Frequency (y)	Product (x · y)
10-19			
20-29			
30-39			
40-49			
50-59			
60-69			
Total			

21. A technician measured the lifespan (in hours) of 5 different light bulbs in a test batch:

12, 10, 15, 11, 12

Task: Calculate the sample standard deviation for this dataset.

22. Draw and label a bell curve using the empirical rule

_____

23. The final scores on a standardized chemistry exam are normally distributed with a mean of 75 and a standard deviation of 5.

Part A: The Empirical Rule

1. Approximately what percentage of students scored between 70 and 80?

2. What range of scores includes the middle 95% of all students?

3. What percentage of students are expected to score above 85?

Part B: Z-Score Calculations

The formula for the z-score is:

1. If a student scores an 83 on the exam, what is their z-score?

2. If a student's z-score is -1.5, what was their actual exam score?

Part C: Relative Performance

1. Another student took a Physics exam where the scores were normally distributed with a mean of 65 and a standard deviation of 10. If the student scored a 75 on the Chemistry exam (mean 75, std dev 5) and a 75 on the Physics exam, on which test did the student perform better relative to their peers?

24. Use the standard normal distribution (mean = 0 standard deviation = 1$) to find the required areas. Round your answers to four decimal places.

1. Find the area under the standard normal distribution curve to the right of z = 1.25.

2. Find the area between z = -0.60 and z = 1.70.

3. Find the area to the left of z = -2.50 and to the right of z = 2.50.

25. The lifespan of a certain brand of smartwatches is normally distributed with a mean of 38 months and a standard deviation of 5 months. Find the probability that a randomly selected smartwatch will last between 40 months and 45 months.

26. The weights of apples harvested from a large orchard are normally distributed with a mean of 200 grams and a standard deviation of 25 grams.

A gourmet food store only buys the apples that are in the heaviest 10% of the harvest. What is the minimum weight (in grams) an apple must have to be purchased by the store?