

NO CELL PHONES ALLOWED. Only scientific calculators (NO graphing, Pro, Multiview, etc.) are allowed.

SHOW ALL WORK **Keep three decimal places in most calculations.**

1. [45] Circle the correct answer.

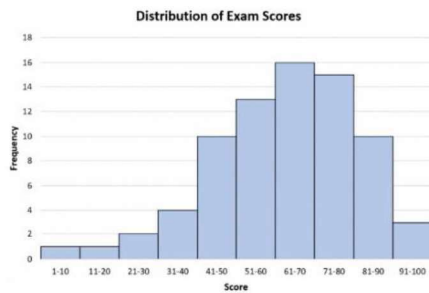
a. Which of the following indicates the strongest linear relationship?

1. $r=0.75$ 2. $r= - 0.95$ 3. $r= 0.09$ 4. $r= - 0.65$

b. Which one of these statistics is unaffected by outliers?

- a. Range b. Mean c. Standard deviation d. Median

c. The following histogram shows the distribution exam scores of students.



What is the approximate shape of the distribution?

1. Nearly symmetric 2. Skewed to the left 3. Skewed to the right 4. Bimodal (has more than one peak)

d. Suppose $P(A) = 0.6$ and $P(B) = 0.3$. What is $P(A \text{ and } B)$ if A and B are independent?

1. 0.3 2. 0.9 3. 0.18 4. 0.85

e. Suppose that a single card is selected from a standard 52-card deck. What is the probability of drawing a Red or Jack?

1. $\frac{23}{52}$ 2. $\frac{2}{13}$ 3. $\frac{7}{13}$ 4. $\frac{15}{26}$

f. Take a simple random sample of size 64 from a normal distribution: $N(\mu = 76, \sigma = 16)$. The distribution of the sample mean \bar{X} is

1. $N(\mu = 76, \sigma = 16)$ 2. $N(\mu = 76, \sigma = 2)$ 3. $N(\mu = 76, \sigma = 0.25)$ 4. $N(\mu = 0, \sigma = 1)$

- g. Ace heating air conditioning service finds that the amount of time a repairman needs to fix a furnace is uniformly distributed between 1.5 and 4.0 hours. Let x = the time needed to fix a furnace. Then $1.5 \leq x \leq 4.0$. Find the probability that a randomly selected furnace repair requires more than 2 hours.
1. 0.4 2. 0.8 3. 0.25 4. 0.6
- h. Determine whether the underlined value is a parameter or a statistic.
- Telephone interviews of 1,502 adults 18 years of age or older found that only 69% could identify the current vice -president.
1. Parameter 2. Statistic
- i. How large a sample size n would you need to estimate population proportion p with margin of error 0.04 with 95 % confidence? Assume that you don't know anything about the value of p .
1. 1068 2. 601 3. 2403 4. 490
- j. Let the sample space be $S = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$. Suppose the outcomes are equally likely. Compute the probability of the event $E =$ "an odd number less than 9".
- a. 0.4 2. 0.5 3. 0.55 4. 0.6
- k. To determine her power outage, Charlotte divides up her day into three parts: morning, afternoon, and evening. She then measures her power outage at 3 randomly selected times during each part of the day.
- What type of sampling is used?
- a. Simple random sampling b. Stratified sampling c. Systematic sampling d. Cluster sampling
- l. Determine whether the variable is qualitative or quantitative.
- Medal won in race**
- a. Qualitative b. Quantitative
- m. Determine whether the quantitate variable is discrete or continuous.
- Number of pieces of lumber used to make a deck.**
- a. Discrete b. Continuous

- n. Suppose the null hypothesis is not rejected. State the conclusion based on the results of the test. Three years ago, the mean price of a single-family home was \$ 243 775. A real estate broker believes that the mean price has increased since then. Which of the following is the correct conclusion?
- a. There is not sufficient evidence to conclude that the mean price of a single-family home has not changed.
 - b. There is sufficient evidence to conclude that the mean price of a single-family home has not changed.
 - c. There is not sufficient evidence to conclude that the mean price of a single-family home has increased.
 - d. There is sufficient evidence to conclude that the mean price of a single-family home has increased.
- o. The null and alternative hypothesis are given. Determine whether the hypothesis left-tailed, right-tailed, or two-tailed.

$$H_0: \mu = 2 \quad H_1: \mu > 2$$

- a. left-tailed
- b. right-tailed
- c. two-tailed.

2. [15] Here are the travel times (in minutes) to work for 8 workers in a small town:

8 12 15 10 5 7

- a. Find the sample Mode, mean and median of these numbers.

- b. Find the standard deviation (s) of these numbers

3. [15] Use the following data

17 23 34 15 35 45 36 53 58 88 22 31 55

a. Find the five-number summary.

b. Is there any outlier in this data set? If any, which value? Use 1.5 IQR rule.

c. Draw a box plot for the data.

4. [10] The lengths of reign of 14 rulers of England and Great Britain are listed below.

21 27 42 77 32 48 32 59 52 88 65 34 55 52

Make a stem plot for the data.

5. [15] Suppose that the talk time on the Apple iPhone is approximately normally distributed with mean 7 hours and standard deviation 0.8 hour.

(a) What proportion of the time will a fully charged iPhone last at least 6 hours?

(b) What is the probability a fully charged iPhone will last less than 5 hours?

(c) What talk time would represent the cutoff for the top 10% of all talk times?

6. [12] In a poll conducted by the Gallup organization, 16% of adult, employed Americans were dissatisfied with the amount of their vacation time. You conduct a survey of 500 adult employed Americans. **(Use Binomial Normal approximation)**

(a) Approximate the probability that the exactly 100 are dissatisfied with their amount of vacation time.

(b) Approximate the probability that at least 60 are dissatisfied with their amount of vacation time

7. [15]

Suppose we use x , the cost of an airplane ticket purchased 30 days in advance to predict y , the cost of the ticket if purchased one day in advance. The correlation $r=0.782$. A summary of a random sample is:

Variables	Mean	standard deviation
Cost (in dollars) purchased 30 days in advance, x	$\bar{x} = 272.6$	$s_x = 23.34$
Cost (in dollars) purchased one day in advance, y	$\bar{y} = 690.3$	$s_y = 233$

- Find the intercept and slope of the least squares line.
- Write the equation of the least-square regression line.
- Predict the cost of a ticket if purchased one day in advance given that the cost of the ticket is \$300 purchased 30 days in advance.

8. [15] The following table gives the sex and age group of college students at a Midwestern university.

	Female	Male	Total
15 to 17 years	89	61	150
18 to 24 years	5,668	4,697	10,365
25 to 34 years	1,904	1,589	3,493
35 years or older	1,660	970	2,630
Total	9,321	7,317	16,638

A student is to be selected at random.

- Find the probability that the selected student is a male.
- Given that the selected student is female, find the probability that she is 18 to 24 years old.

9. [14] A random sample of 50 recent college graduates results in a mean time to graduate of 4.58 years, with a standard deviation of 1.10 years.

Compute and interpret a 95% confidence interval for mean time to graduate with a bachelor's degree.

10. [14] In the Parent-Teen cell phone survey conducted by Princeton survey research associates internationals, 800 randomly selected 16-to-17 year old living in the United States were asked whether they have ever used their cell phone to text while driving. Of the 800 teenagers surveyed, 272 indicated that they text while driving.

Obtain and interpret a 90% confidence interval for the proportion of 16-to-17-year-old who text while driving.

11. [15] The Dog Days Lawn Service advertises that it will completely maintain your lawn at an average cost per customer of \$35 per month. Assume the costs are normally distributed. A random sample of 18 Dog Days customers shows the average cost (mean) to be \$32.50 with a population standard deviation of \$8.10. Do the data support the claim that the average cost per month is less than \$35.00? Use $\alpha = 0.05$ level of significance. Show all steps.

Step 1: Identify the hypothesis:

Step 2: Test statistic:

Step 3: Compare t-values (Classical Approach):

Step 4: Conclusion:

12. [15] You are a biologist studying the wildlife habitat in the Monongahela National Forest. Cavities in older trees provide excellent habitat for a variety of birds and small mammals. A study five years ago stated that 32% of the trees in this forest had suitable cavities for this type of wildlife. You believe that the proportion of cavity trees has increased. You sample 196 trees and find that 79 trees have cavities. Does this evidence support your claim that there has been an increase in the proportion of cavity trees? Use $\alpha = 0.01$ level of significance to test this claim.

Step 1: Identify the hypothesis:

Step 2: Test statistic:

Step 3: P -value:

Step 4: Conclusion: