

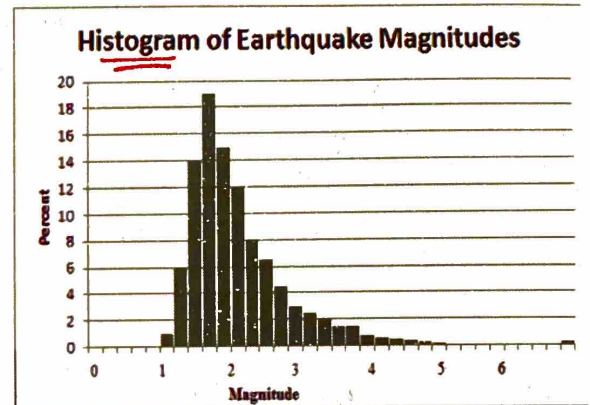
Name: _____ **SOLUTIONS** Practice Test #1

1) The SPCA collects the following data about the dogs they house. Which of the variables is categorical?

- A) Height B) Age C) Weight
 D) Eye Color E) Veterinary Costs

2) Using the histogram on the right answer each question (True/False)?

- a) The mean is less than the median. False
 b) The distribution is skewed to the right. True
 c) The median is the best measure for center. True
 d) The graph displayed is a bar chart. False



3) The table shows different salaries at a company, given that each employee was given a 10% (multiply by 1.10) raise as well as a \$500 bonus calculate the new values for each statistic.

Statistic	Old Value (in \$)	New Value (in \$)
Mean	50,000	$55000 + 500 = 55,500$
Median	54,000	$59400 + 500 = 59,900$
Standard Deviation	18,000	19,800
IQR	24,000	26,400
Max	92,000	$101200 + 500 = 101,700$

4) What two conditions must be met to use the mean and standard deviation to describe the center and spread of a distribution?

Symmetric & No Outliers

5) Name two types of graphical representations you could use to represent quantitative data.

Histograms, Boxplot, Stemplot, Dotplot
(Any 2)

6) In their October 2008 issue, Consumer Reports evaluated the price and performance of 23 models of cordless phones. Computer output gives these summaries for the prices:

Min	Q1	Median	Q3	Max	Mean	SD
15	30	50	110	200	71.75	52.08

a. Check to see if any of the prices are outliers? (Show work and explain)

$$IQR = 110 - 30 = 80$$

$$1.5(80) = 120$$

$$\left. \begin{array}{l} Q_1 - 120 = -90 \\ Q_3 + 120 = 230 \end{array} \right\} \text{No Outliers}$$

b. Based on the measures of center would you say the graph is skewed left, skewed right or approximately symmetric? (Explain your choice)

Skewed Right

Mean > Median

c. Given the mean is 71.75 and the Standard Deviation is 52.08 and assuming the distribution is approximately normal, then approximately what percent of phones would cost under \$100?

$$Z = \frac{100 - 71.75}{52.08} \approx .54$$

Look up $Z \approx .54$
(.7054)

About 70.54% of phones cost under \$100.

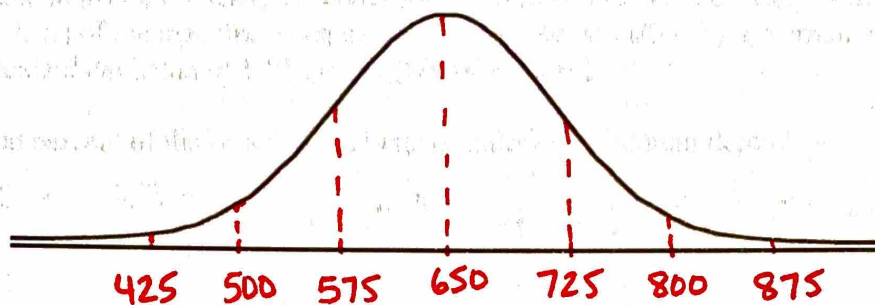
7) Explain how a person's height could be defined as a categorical or quantitative variable?

Categorical: Tall / Short / Avg.

Numerical / Quantitative: Feet / meters / etc.

8) Owners of an exercise gym believe that a Normal model is useful in projecting the number of clients who will exercise in their gym each week. They use a mean of 650 clients and a standard deviation of 75 clients.

a. Draw and clearly label this normal model below.



b. Using this normal model, what percentage of the time would the gym expect to have over 800 clients in a week?

$$z = \frac{800 - 650}{75} = \frac{150}{75} = 2.00 \quad (.9772)$$

$$1 - .9772 = .0228$$

or 2.28% of the time

c. What is the probability that for one week picked at random the number of clients that use the gym is between 500 and 700?

$$z = \frac{700 - 650}{75} \approx .67 \quad (.7486)$$

$$.7486 - .0228 = .7258$$

$$z = \frac{500 - 650}{75} = -2.00 \quad (.0228)$$

$$\approx \underline{\underline{72.58\%}}$$

9) Calculate the mean and standard deviation for the numbers shown: {2, 4, 5, 9}

$$\bar{x} = \frac{2+4+5+9}{4} = \frac{20}{4} = 5$$

$$n = 4$$

$$n-1 = 3$$

$$s = \sqrt{\frac{(2-5)^2 + (4-5)^2 + (5-5)^2 + (9-5)^2}{3}} \approx 2.94$$

10) A roadway construction process uses a machine that pours concrete onto the roadway and measures the thickness of the concrete so the roadway will measure up to the required depth in inches. The concrete thickness needs to be consistent across the road, but the machine isn't perfect and it is costly to operate. Since there's a safety hazard if the roadway is thinner than the minimum 22 inch thickness, the company sets the machine to average (mean) 25 inches for the batches of concrete. They believe the thickness level of the machine's concrete output can be described by a Normal model with a standard deviation of 1.55 inches. [Show all work]

a. What percent of the concrete roadway is under the minimum depth?

$$z = \frac{22 - 25}{1.55} = \frac{-3}{1.55} \approx -1.94 \quad (.0262)$$

$$\approx 2.62\%$$

b. The company's lawyers insist that no more than 4% of the output be under the limit. Because of the expense of operating the machine, they cannot afford to reset the mean to a higher value. Instead they try and reduce the standard deviation to achieve the "only 4% under" goal. What standard deviation must they attain to reach the goal?

$$4\% \rightarrow z \approx -1.75 \quad -1.75 = \frac{22 - 25}{s}$$

$$-1.75 = \frac{-3}{s}$$

$$\boxed{s \approx 1.71}$$

$$s = \frac{-3}{-1.75}$$

11) Describe the difference between a cluster sample and a stratified random sample?

Cluster is when you break the population into groups & randomly select entire group(s).

Stratified is when you break into groups and do on SRS ^{within} each group.

12) The school's newspaper has asked you to contact 100 of the approximately 1100 students at the school to gather information about student opinions regarding food at your school's cafeteria.

With as much precision as possible, describe the population for your study.

All students that attend that school

13) A church group interested in promoting volunteerism in a community chooses an SRS of 200 community addresses and sends members to visit these addresses during weekday working hours to inquire about the residents' attitudes toward volunteer work. Sixty percent of all respondents say that they would be willing to donate at least an hour a week to some volunteer organization. Bias is present in this sample design. Identify the type of bias involved (Use proper terminology).

Undercoverage

14) Each state conducts an annual study of seat belt use by drivers following guidelines set by the federal government. Seat belt use is observed at randomly chosen road locations at random times during daylight hours. Many road locations have been identified in each state's counties. Maine has 16 counties, and samples were taken in each county with sizes proportional to the number of designated locations in that county, so each road location is equally likely to be selected.

a. Is this an SRS of designated road locations in the state of Maine? Explain.

No not every sample is possible

b. If there are 540 possible road locations in Penobscot County, then beginning at line 120 in the random digits table below, choose the first 3 road locations for the sample of Penobscot County locations. Explain your method clearly.

120 35476 ~~55970~~ 39421 65850 04266 35435 43742 11937

121 71487 09984 29077 14863 61683 47052 62224 51025

122 13873 81598 95052 90908 73592 75186 87136 95761

Roads
001-540

354,039,421