

Math 247: Test 1

Name: _____

In-class test _____/80 points

Take home test _____/20 points

1. A study investigated the relationship between positive and negative coaching and performance on a memory test. The researchers took a random sample of 60 college students then randomly placed them into three groups of 20 students each. One group listened to a positive coach (“You can do this!”), one group listened to a negative coach (“You can’t do this”), and the control group had no coaching. Each of the subjects in the groups then took a brief test on memory that had a score from 0 to 10.

This study is (circle one) A RANDOMIZED EXPERIMENT AN OBSERVATIONAL STUDY

The variables in this study are “Type of Coaching” and “Test Score”

What kind of variable is “Type of Coaching”? CATEGORICAL NUMERICAL

What kind of variable is “Test Score”? CATEGORICAL NUMERICAL

Which of these variables is the Treatment (Factor)? _____

Which of these variable is the Outcome (Response)? _____

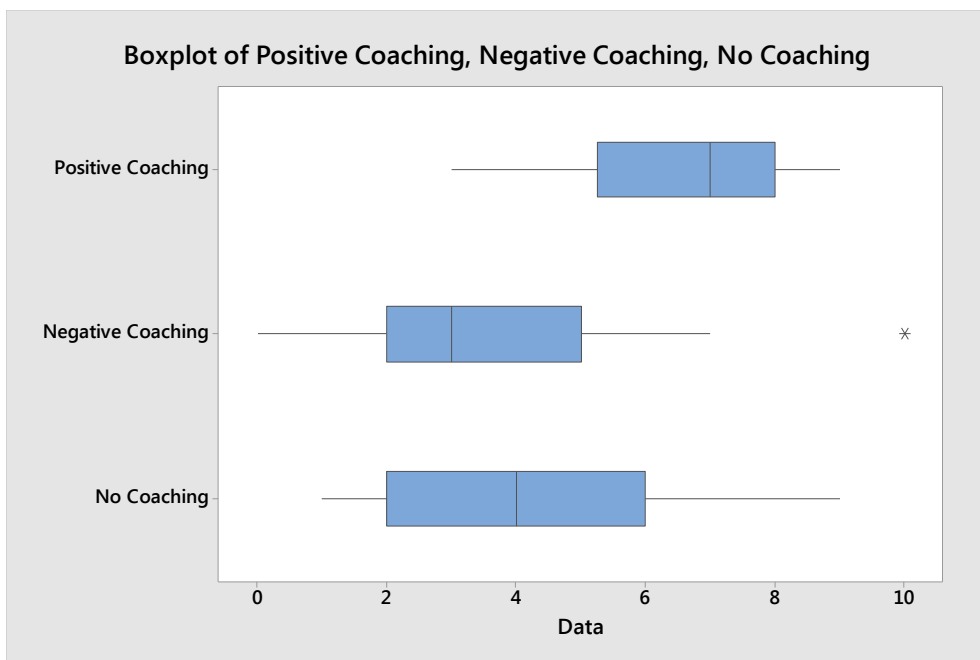
2. The boxplots below show the distribution of the memory test scores for the study described in problem 1, with the 3 groups being “Positive Coaching”, “Negative Coaching”, and “No Coaching”.

Which group’s memory test scores showed the most variability?

Which group’s memory test scores were left skewed?

Which group had an outlier and what is the value of the outlier?

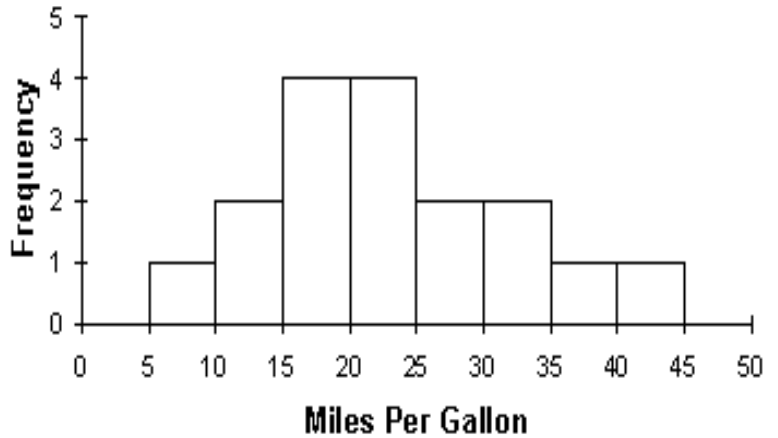
Did the type of coaching seem to have an impact on memory according to these results? Include the “typical value” of each group in your explanation.



6. (3 pts) Why is the median of a data set considered “resistant” and the mean considered “not resistant”?

7. (12 pts) The distribution of gas mileage (mpg) for the top selling cars in 2015 are shown below.

Use the histogram to answer the following questions.



(a) How many cars were in this study?

(b) How many cars had gas mileage under 20 mpg? _____

(c) What is the relative frequency (express as a percent) of the cars that had a gas mileage of 35 mpg or better? _____

(d) Is the data skewed left, skewed right, or approximately symmetric?

(e) Which of the following could be the median and mean of the data? (circle the best answer)

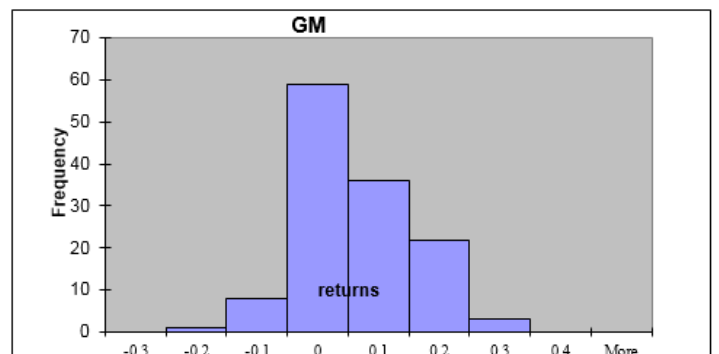
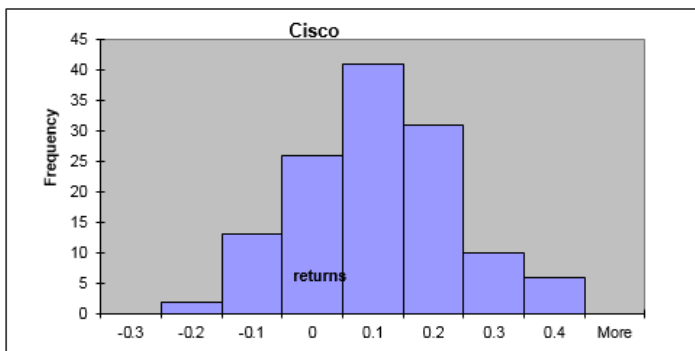
(i) Median = 15, Mean = 20

(iii) Median = 25, Mean = 22.5

(ii) Median = 22.5, Mean = 25

(iv) Median = 25, Mean = 30

8. (3 pts) The two histograms below show the monthly returns (interest) for stocks for Cisco and for GM over a 10 year period. Standard deviation is a measure of risk in stock investment. Which was the riskier stock? Briefly explain.



9. (20 pts) A random sample of 5 students were asked how many pets they have. Their responses were 0, 0, 8, 1, 2

(a) Construct a dot plot of this data.

(b) Find the mean of the data and mark it with a triangle on the dotplot. Then find the median.

(c) Which is a more “typical value” for this data set, the mean or the median? MEAN MEDIAN

(d) By hand, find the standard deviation of the data.

(e) Is the standard deviation “resistant”? Explain.

11. (9 pts) The average head circumference of 1 week old female infants is 35 centimeters with a standard deviation is 1.5 centimeters. Assume head circcumferences are symmetrically distributed.

(a) Sketch a curve, with the x-axis labeled appropriately, showing the distribution of head circumferences.

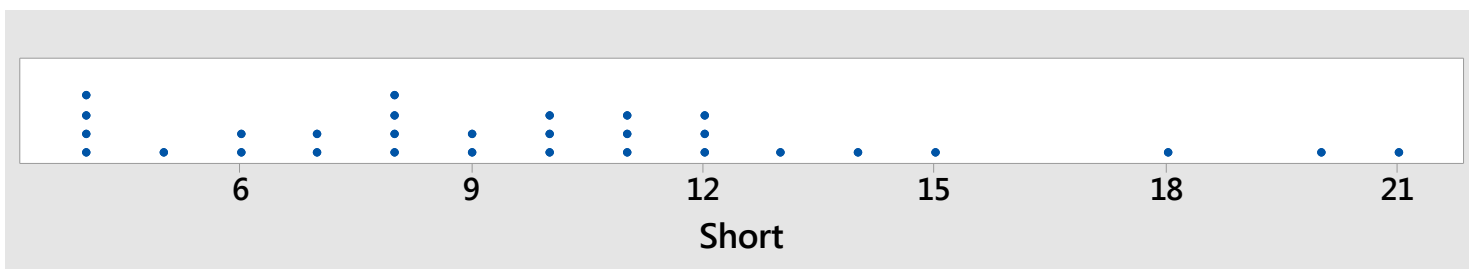
(b) Between what two values should about 68% of the head circumferences fall?

(c) Find the z-score for the baby girl with a head circumference of 31.5 cm.



(d) “Microcephaly” is defined as a baby having a head circumference of more than 2 standard deviations from the mean. Does the baby from part (c) have microcephaly? Include the meaning of the z-score you found in part (c) in your answer.

A student asked 30 students who ride a short board how many days per month they surf. The data is displayed in a dotplot below, with the descriptive statistics for the group shown below the dotplot.



Descriptive Statistics: Short

Variable	N	N*	Mean	SE Mean	StDev	Minimum	Q1	Median	Q3	Maximum
Short	30	0	9.900	0.821	4.498	4.000	6.750	9.500	12.000	21.000

What is the five number summary for this data set? _____

Find the IQR.

Find the Lower Outlier and Upper Outlier Limits.

How many outliers are there in this data set and what are they?