

**Welcome to AP Statistics!**  
(2019-2020)

You have selected a college-level course unlike any other math course. The material is extremely relevant to almost all aspects of life. We expect you to put forth a strong, consistent effort.

The purpose of this *Summer Assignment* is to:

1. Give you information on what to expect, and how this course is different from other math courses.
2. Refresh your knowledge on statistics topics that you should know prior to this course.
3. Give you a chance to demonstrate your ability to analyze data and write conclusions.

Below is a list of statistical sites on the Internet that can help you define terms, explain concepts, and provide detailed examples: (*other sites can be used*)

- <http://www.stattrek.com/tutorials/statistics-tutorial.aspx>
- <http://www.mrholloman.net/APS/Notes/index.htm>
- [http://apstatsmonkey.com/StatsMonkey/TI83-84\\_Guide.html](http://apstatsmonkey.com/StatsMonkey/TI83-84_Guide.html) (graphing calculator guide)

- ❖ **THIS ASSIGNMENT IS DUE AT OUR FIRST CLASS MEEETING AT THE END OF AUGUST.**
  - ❖ **THIS WILL COUNT AS YOUR FIRST TEST GRADE**

If you have any questions or concerns while completing this assignment, email Mrs. Ames ([aames@hamden.org](mailto:aames@hamden.org)).

1) What is a statistic?

2) Explain the difference between a categorical variable and a quantitative variable.

3) Determine if the variables listed below are *quantitative* or *categorical*. Neatly print "Q" for quantitative and "C" for categorical.

- \_\_\_\_\_ 1. Time it takes to get to school
- \_\_\_\_\_ 2. Number of shoes owned
- \_\_\_\_\_ 3. Hair color
- \_\_\_\_\_ 4. Temperature of a cup of coffee
- \_\_\_\_\_ 5. Teacher salaries
- \_\_\_\_\_ 6. Gender
- \_\_\_\_\_ 7. Height
- \_\_\_\_\_ 8. Amount of oil spilled
- \_\_\_\_\_ 9. Age of Oscar winners
- \_\_\_\_\_ 10. Type of pain medication
- \_\_\_\_\_ 11. Jellybean flavors
- \_\_\_\_\_ 12. Country of origin

4) What types of graphs are appropriate when working with categorical variables? Quantitative variables?

5) What is the meaning of distribution in statistics?

6) When describing a distribution, what 3 things should you always mention?

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- 7) Explain the difference between range and interquartile range.
- 8) Create a data set (with 5 numbers) in which the mean is equal to the median.
- 9) Create a data set (with 5 numbers) in which the mean is *greater than* the median.

10) **SHOPPING SPREE!**

A marketing consultant observed 50 consecutive shoppers at a supermarket. One variable of interest was how much each shopper spent in the store. Here are the data (rounded to the nearest dollar), arranged in increasing order:

3	9	9	11	13	14	15	16	17	17
18	18	19	20	20	20	21	22	23	24
25	25	26	26	28	28	28	28	32	35
36	39	39	41	43	44	45	45	47	49
50	53	55	59	61	70	83	86	86	93

Make a **stemplot** using tens of dollars as the stem and dollars as the leaves.  
**\*\*Make sure you include a key.**



### 11) SSHA SCORES

Here are the scores on the Survey of Study Habits and Attitudes (SSHA) for 18 first-year college women:

154 109 137 115 152 140 154 178 101 103 126 126 137 165  
165 129 200 148

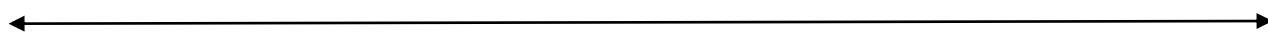
and for 20 first-year college men:

108 140 114 91 180 115 126 92 169 146 109 132 75 88  
113 151 70 115 187 104

a) Put the data values in order for each gender. Compute numerical summaries for each gender.

Women			Men	
Mean			Mean	
Minimum			Minimum	
Q1			Q1	
Median			Median	
Q3			Q3	
Maximum			Maximum	
Range			Range	
IQR			IQR	

b) Using the Minimum, Q1, Median, Q3, and Maximum from each gender, make parallel **boxplots** to compare the distributions. Make sure to label the horizontal axis.



- 12) How is a parameter different from a statistic?
- 13) Explain how to standardize a value. What is the purpose of standardizing?
- 14) **SAT versus ACT** - Eleanor scores 680 on the mathematics part of the SAT. The distribution of SAT scores in a reference population is symmetric and single-peaked with mean 500 and standard deviation 100. Gerald takes the American College Testing (ACT) mathematics test and scores 27. ACT scores also follows a symmetric, single-peaked distribution but with mean 18 and standard deviation 6. Find the standardized scores for both students. Assuming that both tests measure the same kind of ability, who has the higher score? \_\_\_\_\_
- 15) Briefly explain the 68-95-99.7% Rule.
- 16) **Men's heights** - The distribution of heights of adult American men is approximately Normal with mean 69 inches and standard deviation 2.5 inches.
- a) Draw a Normal curve. Be sure to label the mean, as well as the points one, two, and three standard deviations away from the mean on the horizontal axis.

[#16 cont.]

b) Use the 68-95-99.7% Rule to answer the following questions

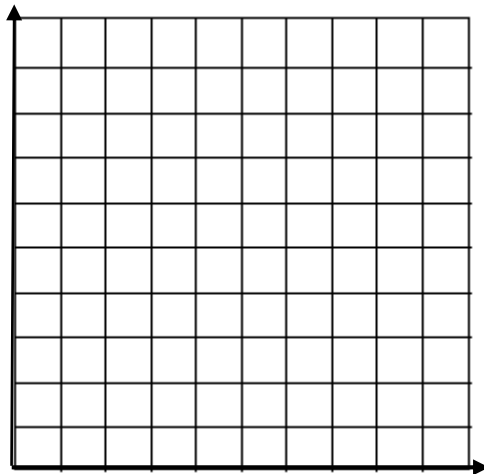
- What percent of men are taller than 74 inches? \_\_\_\_\_
- Between what heights do the middle 95% of men fall? \_\_\_\_\_
- What percent of men are shorter than 66.5 inches? \_\_\_\_\_

17) What type of graph is used to show the relationship between 2 quantitative variables? \_\_\_\_\_

18) What does the sign (+/-) of the correlation coefficient tell you about the association between 2 quantitative variables?

19) What does an 'r' value near 1 or -1 indicate?

20) Sketch an example of a scatterplot with correlation near 0.

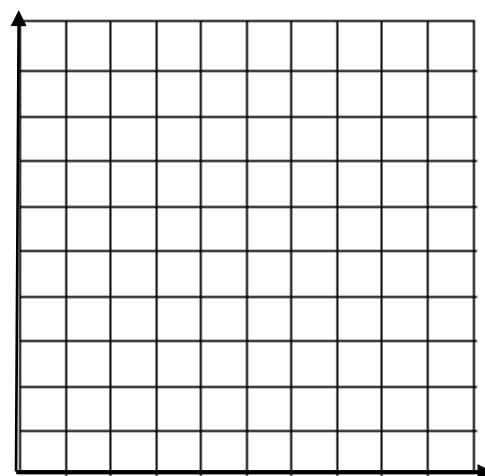


21) Explain the steps required to perform a linear regression on data in  $L_1$  and  $L_2$  on the graphing calculator. (*\*A graphing calculator is strongly recommended for this class.*)

22) **Meet the Archaeopteryz** - *Archaeopteryz* is an extinct beast having feathers like a bird but teeth and a long bony tail like a reptile. Only six fossil specimens are known. Because these specimens differ greatly in size, some scientists think they are different species rather than individuals from the same species. We will examine some data. If the specimens belong to the same species and differ in size because some are younger than others, there should be a positive linear relationship between the lengths of a pair of bones from all individuals. An outlier from this relationship would suggest a different species. Here are data on the lengths in centimeters of the femur (a leg bone) and the humerus (a bone in the upper arm) for the five specimens that preserve both bones.

<b>Femur</b>	38	56	59	64	74
<b>Humerus</b>	41	63	70	72	84

- a) Make a **well-labeled** scatterplot.  
Do you think that all five specimens come from the same species? \_\_\_\_\_



- b) Describe the overall pattern. Include the direction, form and strength of the relationship.
- c) Draw a line of best fit. Give an *approximation* of the slope and y- intercept. Write an equation for your line. \_\_\_\_\_

23) Define residual. Looking back at your graph in #22, do you think there would be any large residuals? \_\_\_\_\_ *Explain why or why not.*

24) Explain the difference between an observational study and an experiment.

25) List the 3 Principles of Experimental Design.

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26) The 7 types of sampling designs are:

- A. voluntary response      B. convenience      C. simple random  
D. stratified      E. cluster      F. multistage  
G. systematic

The Maryland division of Weight Watchers is doing research to determine how many people on the Weight Watchers diet cheat at least once a week. They decide that anonymous surveys will give them an accurate representation but do not have time to get responses from ALL the Maryland Weight Watchers people.

*Read the scenarios below and determine which of the 7 sampling methods best describes it.*

- \_\_\_\_\_ I. Randomly select 10 members from each of the WW centers in the Maryland division.
- \_\_\_\_\_ II. Use an alphabetical listing of all Maryland division members. Randomly choose a starting person on the list. Then select every 20th person thereafter.
- \_\_\_\_\_ III. Randomly select 2 or 3 branches of the Maryland division and survey every member of that center.
- \_\_\_\_\_ IV. Send out the survey to every member of the Maryland division. Place drop boxes in each WW center. Anyone who returns a survey will be in the sample.
- \_\_\_\_\_ V. The Maryland regional office is in Baltimore so they survey members at the WW center in Baltimore.
- \_\_\_\_\_ VI. From a numbered list of all Maryland division members use a computer to randomly select 100 numbers and survey all members with those corresponding numbers.