

Summer 2020

To all students enrolled in AP Statistics and their parents/guardians,

Congratulations on your decision to enroll in AP Statistics! You have decided to take a course that is often a requirement in many college majors in the fields of health science, social science, and business. This course will also have you thinking about how you interpret data to make informed decisions as a consumer.

Although AP Statistics requires only an Algebra II prerequisite, it is not an easy course. As for all AP courses, it does require a great deal of commitment within and outside the classroom. AP Statistics is a special course that combines both mathematical and verbal skills. You will be required to write descriptive paragraphs and concluding sentences to prepare you for the AP Exam. You will have to explain the reasoning behind the method you choose and the conclusions you find.

AP Statistics will expose you to four central themes: exploring data, research design, probability and simulation, and statistical inference. The AP Exam contains questions from each of these 4 clusters. Each chapter test and the AP Exam are comprised of multiple choice and open ended questions.

How can we prepare for this class? Although many of the concepts in the Course are introduced for the first time in this class there are some concepts to review to help you prepare for this course. Complete this summer packet before the first day of class. This packet will be collected for a grade on the **first Friday** of the school year. I will be starting class assuming you have completed the packet.

****All AP Statistics students are required to have a graphing calculator.** I recommend the TI-84. You may want to watch out for back-to-school sales.

Some sections of the Summer work packet contains notes, while other sections contains problems to work out. Read the entire packet and work out the problems indicated.

I look forward to seeing you next school year!

Sincerely,

Mrs.Whitt

AP Statistics Teacher

swhitt@lvhs.org (Email me over the summer if you have any questions as you work

through the packet.)

Part 1- Algebra Review (Practice Problems):

1.) Evaluate z if $z = \frac{x - \mu}{\sigma}$ where $x = 20$, $\mu = 10$, and $\sigma = 2$.

2.) Given: $z = \frac{x - \mu}{\sigma}$, solve for σ .

3.) Given: $z = \frac{x - \mu}{\sigma}$, solve for μ .

4.) Given: $0.05 = 1.96 \sqrt{\frac{0.5^2}{n}}$, solve for n .

5.) Given: $-1.64 = \frac{60 - \mu}{\sigma}$ and $1.96 = \frac{95 - \mu}{\sigma}$, solve for μ .

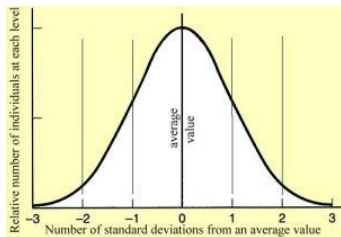
6.) Given: $-1.64 = \frac{60 - \mu}{\sigma}$ and $1.96 = \frac{95 - \mu}{\sigma}$, solve for σ .

7.) Find the equation of the line in slope intercept form ($y = mx + b$) that goes the points $(-2, 4)$ and $(5, 7)$

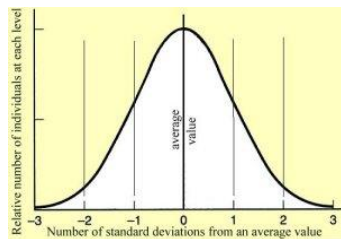
8.) Given: $\log_{10} 100 = x$ evaluate $10^x = \underline{\hspace{2cm}}$

9.) Given: $\ln 100 = x$ evaluate $10^x = \underline{\hspace{2cm}}$

10.) Shade the area under curve where $z \geq 2$ (Z is the horizontal axis at the bottom of the curve)



11.) Shade the area under the curve where $z \leq -1$



Part 2- Types of Data (Notes and Practice Problems):

Quantitative (or numerical) Data

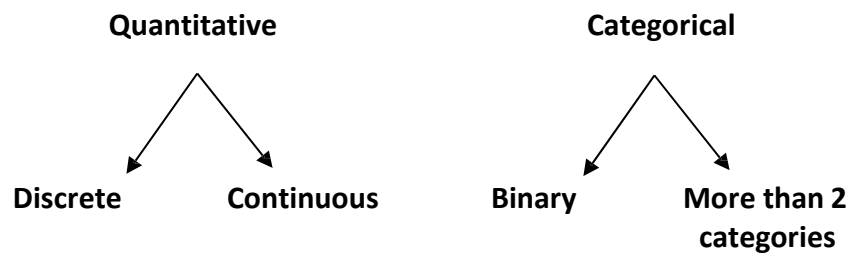
There are data that take on numerical values that actually represent a measurement such as size, weight, how many, how long, score on a test, etc. Some quantitative variables take on **discrete** (counting) values, such as shoe size (6, $6\frac{1}{2}$, 7,...) or the number of soup cans collected by a school.

Other quantitative variables take on **continuous** (measurement) values, such as height (60 inches, 72.999923 inches, 64.039 inches, etc) or how much water it takes to fill up your bathtub (73.293 gallons, or 185.3 gallons or 99 gallons, etc). For these data, it makes sense to find things like “average” or “range” (largest value – smallest value).

Categorical (or qualitative) data

There are data that take on values that describe a characteristic such as color of shirts or gender. Some qualitative variables take on **binary** values, such as gender (M or F) or an answer to the question, “Are you going to the prom?” (yes or no). For these data, it makes no sense to find things like “average” or “range”. To analyze these data, you count the number of Males or Females, the number of Yes responses and No responses. Categorical data can sometimes have more than 2 answer choices. An example might include “World language studied in high school”. These data could take on the values, Spanish, French, Chinese, Russian, etc.

Two types of variables:



Exercises: Answer the following questions and then decide if the data is quantitative or categorical. (Q or C) If the variable is quantitative, then **also state** whether it is discrete or continuous. (D or C)

	Answer	Type
1. In what grade did you take Algebra 1?	_____	_____
2. Do you own more than 20 pairs of shoes?	_____	_____
3. How old was your father when you were born?	_____	_____
4. How many pets do you have?	_____	_____
5. What is your hair color?	_____	_____
6. How many siblings do you have?	_____	_____
7. In what state were you born?	_____	_____
8. How tall are you measured in inches?	_____	_____
9. How many AP classes will you take this year?	_____	_____
10. What is your gender?	_____	_____
11. Where did you eat your last meal?	_____	_____
(1=home, 2=restaurant, 3=other)		
12. How long have you lived in this area?	_____	_____
12. Are you enrolled in Honors English this year	_____	_____
13. What is your GPA?	_____	_____
14. Is your car a standard or manual?	_____	_____

Part 3 - Numerical Descriptions - Practice Problems:

Last year students collected data on the age of their moms and dads when they (the students...) were born. The following are their results.

Dad: 41 27 23 31 30 33 26 32 43 25 34 27
25 34 27 26 28 32 32 35 27 33 34 34
34 35

Mom: 39 26 23 30 28 33 23 32 38 23 35 24
24 33 24 23 24 32 23 30 24 29 34 35
26 31

Now type the data into your calculator using the list function: **STAT** → **ENTER** → type the Dad into L₁. If you make a mistake, you can go to the error and **DELETE**. If you forget an item, you can go to the line below where it is supposed to be and press **2nd DEL** to insert it. Do the same for the Mom data, but put into L₂.

NOTE: If the lists you are using already have numbers in them before you start, you can clear them this way: Arrow up (↑) to the line where L₁ is shown. Press **CLEAR**, then the down arrow (↓).

1. Find the mean and the median for the Dad data. To find the mean using your calculator, go to **2nd STAT** → **MATH** → **5** and then type in L₁ by typing **2nd → 1**. This will add all the values in the list. Then divide by 26 to get the mean. If you do not have a calculator, please calculate by hand.

To find the median, sort the data in the lists: **STAT** → **2** → **L₁** The median is exactly in the middle between the 13th and the 14th value. If you do not have a TI-84 graphing calculator yet, you may of course find these values by hand.

Mean _____ Median _____

Are they the same? _____

If not, which is larger? _____

2. Find the mean and the median for the mom data.

Mean _____ Median _____

Are they the same? _____

If not, which is larger? _____

3. Now compare the two means you calculated. Which is larger? _____ Is this result what you expected? _____ Why/why not?

4. Calculate the range for each set of data. Dad _____ Mom _____

5. Are these ranges about the same? _____ If no, what are some reasons that might cause this difference?

Part 4 - Additional Practice Problems.:

1. This table shows the median US family income (in 2003 dollars) for selected

years. *Let x be the number of years since 1940.*

Year	Median Family Income (\$)
1947	21,201
1973	43,219
1979	45,989
1989	49,014
1995	48,679
2000	54,191
2003	52,680

- a. Enter the data into your graphing calculator and create the scatter plot for this data. **Draw the scatter plot on 8 ½ by 11 inch graph paper drawn to scale.**

b. Find the linear regression line using your graphing calculator. (See calculator user's guide if needed.)

c. Superimpose the regression line on the scatter plot.

d. Use your regression line to predict the median US family income in 2013.

e. Calculate the mean, median and mode of the family income.

2. Using 20th century US census data, the population of New York can be modeled by:

$$P(t) = \frac{19.875}{1 + 57.993e^{-0.035005t}}$$

where P is the population in millions and t is the number of years since 1800. Based on the model,

a. What is the population of New York in 1852?

b. What will the population be in 2015?

c. What is New York's maximum sustainable population (limit to growth)?

5. Enter the following data into your graphing calculator. Create a scatter plot of the data. Draw the scatter plot on graph paper drawn to scale.

(0,15) (1,40) (1,35) (2,45) (2,55) (2,60) (3,45) (3,40) (4,56)
(5,60) (6,72) (7,80) (7,85) (8,96) (8,92) (9,85)

a. This (x,y) data represents the final exam scores and the number of hours studied for the Honors Chemistry Final Exam. Which variable represents the number of hours studied? Which variable represents the Final Exam grade?

b. (It's time to do some writing.) Describe the scatter plot in as much detail as possible. Does the data suggest a linear, quadratic, exponential or another relationship? Describe the slope. Draw a conclusion about the number of hours studied and the Final Exam grade. Estimate the number of hours necessary needed to study to get a 100% on the test.