



Statistics - Summer Review Packet – 2017

DUE THE FIRST DAY OF CLASS

In preparation for the Fall Semester, this assignment is required to prepare you for your Statistics course.

About Statistics:

Statistics is the branch of mathematics pertaining to the practice and science of collecting and analyzing numerical data in large quantities, especially for the purpose of inferring proportions in a whole from those in a representative sample. Students use a graphing calculator as an integral tool in analyzing data and modeling functions to represent real world applications. Lacordaire Academy recommends a TI-84 Plus calculator. It will be used throughout your high school and college career.

Expectations of the Summer Packet:

The problems in this packet are designed to help you review topics that are important to your success in Algebra I / Algebra I Honors. **All work must be shown for each problem.** The problems should be done correctly, not just attempted.

The packet is due the first day of school. During the first week(s) of school, concepts in the packet will be reviewed.

All work should be completed and ready to turn in on the first day of classes.

Notes: The internet is a great resource... use it!

Some helpful sites:

www.mathisfun.com (click on data)

www.khanacademy.com

Enjoy your summer!

- V. Roche, Math Dept. Chair E-mail: vroche@lacordaire.net

Additional copies of this packet are available for printing from my webpage <http://lacordaireacademy.com/faculty-page/victoria-roche/> or stop by the school.

Please call for summer hours!

Part 1: Introduction to Statistics

Sta-tis-tics

Etymology: German *Statistik*: study of political facts and figures, from New Latin *statisticus*: of politics, from Latin *status*: state. Date: 1770

1 : a branch of mathematics dealing with the collection, analysis, interpretation, and presentation of masses of numerical data *[note: this is for Statistics with a uppercase S]*

2 : a collection of quantitative data *[note: this is for statistics with a lowercase s]*

Source: <http://www.merriam-webster.com/dictionary/statistics>

Answer the following in complete, well written sentences, to the best of your ability:

1) Before you saw this definition, how would you have defined Statistics? Has your definition changed after reading this?

2) How one collects the data is extremely important. Explain how you would conduct a survey to determine the percentage of Mercer Island High School students who are satisfied with the quality of education that they are receiving. Due to resource constraints, however, you will only be able to ask 100 students.

3) You have worked with data before in your science classes, if nowhere else. Provide one example from your life in which you have worked with data. How did you collect it? How did you analyze it? How did you present your findings? What conclusions did you come to?

4) Tell me what you have heard from other people about this class.

5) This class is an elective. So, why did you sign up for it?

6) Find a newspaper or magazine article involving statistics. Bring a hard copy (not electronic) of your article to class on the first day, attached to this packet. Write a summary of your article here:

Part 2: Data and Its Context + Reading Comprehension Involving Statistics

Read the following...

“Teen Automobile Crash Rates Are Higher When School Starts Earlier”

ScienceDaily (June 10, 2010) — Earlier school start times are associated with increased teenage car crash rates, according to a research abstract presented June 9, 2010, in San Antonio, Texas, at SLEEP 2010, the 24th annual meeting of the Associated Professional Sleep Societies LLC.

Results indicate that in 2008 the teen crash rate was about 41 percent higher in Virginia Beach, Va., where high school classes began at 7:20 a.m., than in adjacent Chesapeake, Va., where classes started more than an hour later at 8:40 a.m. There were 65.4 automobile crashes for every 1,000 teen drivers in Virginia Beach, and 46.2 crashes for every 1,000 teen drivers in Chesapeake.

“We were concerned that Virginia Beach teens might be sleep restricted due to their early rise times and that this could eventuate in an increased crash rate,” said lead author Robert Vorona, MD, associate professor of internal medicine at Eastern Virginia Medical School in Norfolk, Va. “The study supported our hypothesis, but it is important to note that this is an association study and does not prove cause and effect.”

The study involved data provided by the Virginia Department of Motor Vehicles. In Virginia Beach there were 12,916 drivers between 16 and 18 years of age in 2008, and these teen drivers were involved in 850 crashes. In Chesapeake there were 8,459 teen drivers and 394 automobile accidents. The researchers report that the two adjoining cities have similar demographics, including racial composition and per-capita income.

1) Answer the following questions regarding the above excerpt:

- a) *Who* is being studied?

- b) *What* about those individuals is being recorded / analyzed (i.e. what are the variables?)? Do you think the variables are categorical or quantitative in nature?

- c) *When* was the data collected?

- d) *Where* was the data collected (more accurately: what geographical area is associated with the data)?

- e) *Why* do you think this data was collected and analyzed?

f) *How* was the data collected and analyzed? In other words, what methods were used?

g) Why do you think the authors of the study mentioned that “it is important to note that this is an association study and does not prove cause and effect?”

2) Answer the same questions in (a) – (f) above, except now do it for the article that you found regarding statistics:

Pick a simple question with simple responses that you would like to ask (e.g. Do you prefer iPhone, Blackberry, or Android?)

Ask 30 random people the question, and record their response as well as their gender (try to get a roughly equivalent number of boys and girls):

#	Response to Question	Gender
1		M F
2		M F
3		M F
4		M F
5		M F
6		M F
7		M F
8		M F
9		M F
10		M F
11		M F
12		M F
13		M F
14		M F
15		M F
16		M F
17		M F
18		M F
19		M F
20		M F
21		M F
22		M F
23		M F
24		M F
25		M F
26		M F
27		M F
28		M F
29		M F
30		M F

Summarize your results in a table:

Summarize your findings in one or more graphs:

Does one's gender appear to be independent of how one responds to this question? Explain, and use your results to support your argument.

Part 4: Displaying and Describing Quantitative Data

Consider the following data set: $\{-2, 0, 4, 2, 2\}$

Find the **mean** (average) (show work)

Find the **median** (middle value) (show work):

Identify the **mode**:

If the number 20 was added to the data set, what would the new mean be? (show work)

If the number 20 was added to the data set, what would the new median be? (show work)

Which one changed more?

If you had 50 numbers arranged in numerical order, the median would be the average of the ___ and ___ numbers.

If you had 49 numbers arranged in numerical order, the median would be located at the ___ number.

Keep a record of the number of hours of sleep you get each night during a two week period. Round each time to the nearest half-hour. (no quarter-hours please)

Two-week period: _____

	Mon	Tue	Wed	Thu	Fri	Sat	Sun
Week 1							
Week 2							

Determine the measures of center (mean, median and mode)

What do these values tell you about your “typical” sleep time?

Determine the measures of variability (range, standard deviation, interquartile range)

What do these values tell you about how your sleep times vary on average?

Use your data to create the following data displays:

Dotplot:

Stemplot

Histogram: Explain your choice of bin width

Boxplot: are there any outliers?

Part 5: Combinatorics and Probability

Show how you arrived at each answer. If you are having difficulty with these, check out the tutorials on this site: <http://www.intmath.com/counting-probability/counting-probability-intro.php> (there are many other good tutorial sites as well)

- 1) If there are 3 appetizers, 3 entrees, and 2 desserts available, how many different three course meals are possible?

- 2) Suppose three coins are tossed, and each time, they turn up heads. What is the probability that the next toss will be heads?

- 3) How many ways are there to arrange the first five letters of the alphabet (no repetition of characters)?

- 4) How many 4 digit PINs (personal identification numbers) are possible if repetition of digits is allowed?

- 5) There are three slots available per day for oral presentations in a hypothetical class. If there are 25 students in the class, how many ways can the presentations be arranged on the first day?

- 6) For two standard 6 sided dice,
 - a. What is the probability of rolling two sixes?

 - b. Of not rolling two sixes?

 - c. Of rolling a sum of three?

- 7) Two cards are drawn from a standard 52 card deck. What is the probability that they're both aces?

- 8) 7 people (4 boys and 3 girls) are available to play basketball. How many 5 person teams are possible if each team must have 3 boys and 2 girls on it?

- 9) Let's say a person makes 3 out of every 4 free-throws, on average. If they shoot four shots, what is the probability that they will make exactly three?

Part 6: Algebra Review

1) Evaluate z if $z = \frac{x - \mu}{\sigma}$ and $x = 20$, $\mu = 10$, and $\sigma = 2$. (If you don't know already, μ is the Greek lowercase "m" (we say "mu" (like *myoo*)) and σ is the Greek lowercase "s" (we say "sigma").)

2) Solve $z = \frac{x - \mu}{\sigma}$ for σ , then for μ

3) Solve $0.05 = 1.96 \sqrt{\frac{0.5^2}{n}}$ for n .

4) If $-1.64 = \frac{60 - \mu}{\sigma}$ and $1.96 = \frac{95 - \mu}{\sigma}$, solve for μ and σ .

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