

## AP Statistics Summer Work

Name: \_\_\_\_\_

The AP Statistics course is equivalent to a one-semester, introductory, non-calculus-based college course in statistics. The course introduces students to the major concepts and tools for collecting, analyzing, and drawing conclusions from data. There are four themes in the AP Statistics course: exploring data, sampling and experimentation, anticipating patterns, and statistical inference. Students use technology, investigations, problem solving, and writing as they build conceptual understanding.

### I. Exploring Data

- Constructing and interpreting graphical displays of distributions of univariate data
- Summarizing and comparing distributions of univariate data
- Exploring bivariate and categorical data

### II. Sampling and Experimentation

- Planning and conducting surveys and experiments using appropriate methods of data collection
- Generalizability of results and types of conclusions that can be drawn from observational studies, experiments, and surveys

### III. Anticipating Patterns

- Exploring random phenomena using probability and simulation
- Combining independent random variables
- The normal distribution
- Sampling distributions

### IV. Statistical Inference

- Estimating population parameters and testing hypotheses
- Tests of significance

The summer work is divided into four parts, vocabulary, symbols, formulas and practice problems. Each part needs to be completed and turned in on the first day of class. You may use online resources to help you complete any section, and it is suggested to do so in the vocabulary section.

Some suggested resources are math is fun, stat trek, and khan academy. When looking up vocabulary and symbols it is suggested that you also enter the term math or statistics after as these terms and symbols have a variety of meanings depending on the context.

Along with the summer work attached is a parent/guardian letter that gives some information, on the back side there is a place that requires both you the student and your parent/guardian to sign a provide contact information. This must also be completed and brought in the first day of class.

In this section you are to look up each of the words, In the first box you are to write the formal definition of the term, in the second box you are to write the definition in your own words, and finally in the third box you are to draw a picture or create an example.

Formal Definition	Definition in your own words	Picture or Example
Qualitative (Categorical) Data -		
Quantitative Data -		
Discrete Variable -		
Continuous -		
Univariate Data -		
Bivariate Data -		
Population -		

Formal Definition	Definition in your own words	Picture or Example
Sample -		
Median -		
Outliers -		
Parameter -		
Statistic -		
Center -		
Spread -		
Symmetry -		

Formal Definition	Definition in your own words	Picture or Example
Unimodal -		
Bimodal -		
Skewed Right -		
Skewed Left -		
Uniform -		
Normally Distributed -		
Gaps		
Dot Plots -		

Formal Definition	Definition in your own words	Picture or Example
Bar Chart -		
Histogram -		
Stem Plots -		
Box Plots -		
Quartiles -		

### Questions

1. What is the difference between bar charts and histograms?
  
2. What are the four ways to describe data sets?
  
3. What types of graphs are their those can be used for comparing data?

In the following section look at the symbol in the first box, read the English way to pronounce it in the second box, and write out the symbols meaning in the third box.

Symbol	English Pronunciation	Symbol meaning
$\Sigma$	Upper Case Sigma	
$\mu$	Lower Case mu	
$\bar{x}$	x bar	
$\sigma$	Lower Case Sigma	
$\sigma^2$	Lower Case Sigma squared	
s	s	
$s^2$	s squared	
n	n	
P	p	
U	Union	

$\cap$	Intersection	
--------	--------------	--



The following list contains important calculations that we will be using throughout the course. For each calculation write out the formula using symbolic notation (variables) in the second box and write out the formula in words in the third box.

Calculation	Symbolic Formula	Formula In words
Population Mean		
Sample Mean		
Population Variance		
Sample Variance		
Population Standard Deviation		
Sample Standard Deviation		
Range		
Interquartile Range		
Outliers		

Standard Score (Z-score)		



For each of the practice problems read the question and place your response/graph in the space provided.

**Section 1: Read each of the following and determine if the variable listed below is quantitative or qualitative (categorical)**

1. Time it takes to get to school
2. Number of people under the age of 18 living in a household
3. Hair Color
4. Temperature of a cup of coffee
5. Teacher Salaries
6. Gender
7. If a person smokes
8. Height
9. The amount of oil spilled
10. Age of Oscar winners
11. Type of depression medication
12. Jellybean flavors
13. Country of origin
14. Type of meat
15. Number of shoes owned

**Section 2: A statistic is a number calculated from a set of data. Quantitative data has many different statistics that can be calculated. Determine the given statistics from the data below on the number of homeruns Mark McGuire hit in each season from 1982-2001. Show any work/formulas used.**

70	52	22	49	3	32	58	39
39	65	42	29	9	32	9	33

1. Mean - 2. Median -



3. Maximum -

4. Minimum -

5.  $Q_1$  (quartile 1) -

6.  $Q_3$  (quartile 3) -

7. Range -

8. IQR (interquartile range) -

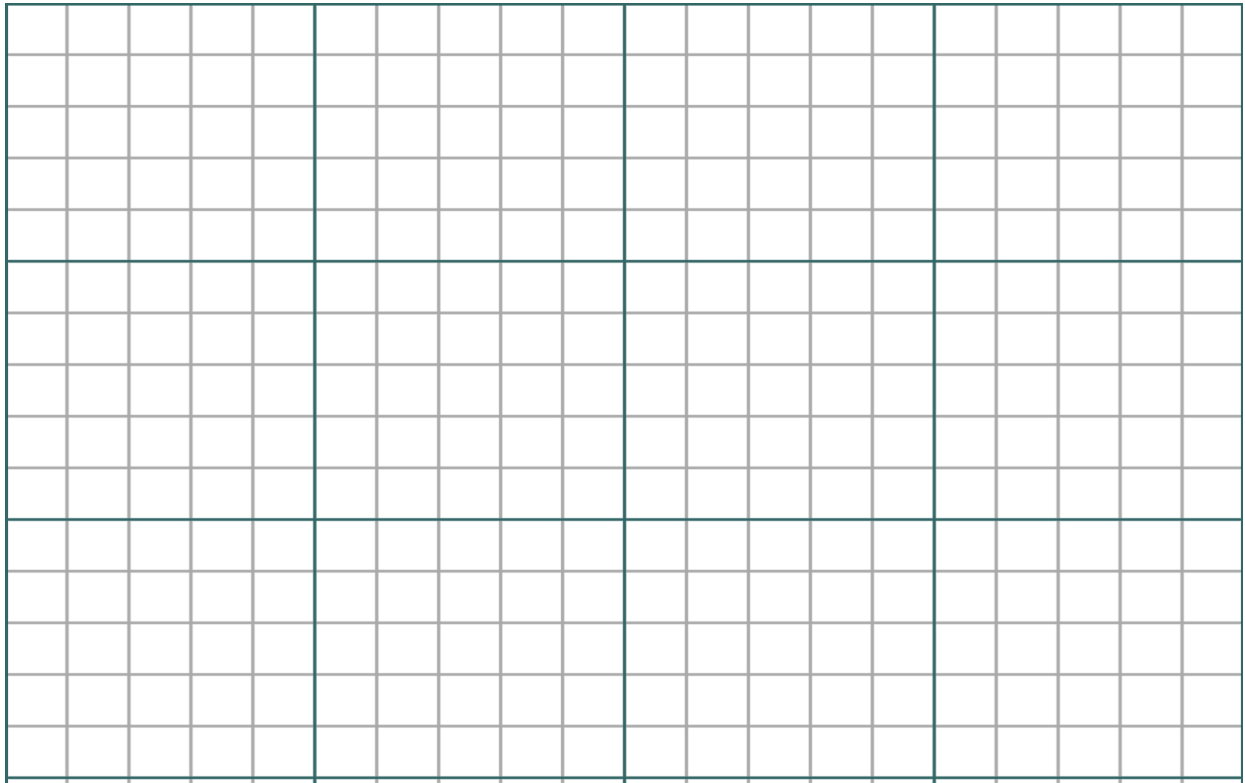
Section 3: Use the following information to answer the questions and create the graph. Show all your work

In 1997 there were 92,353 deaths from accidents in the United States. Among these were 42,340 deaths from motor vehicle accidents, 11,858 from falls, 10,163 from poisoning, 4051 from drowning and 3,601 from fires. The rest were listed as “other” causes.

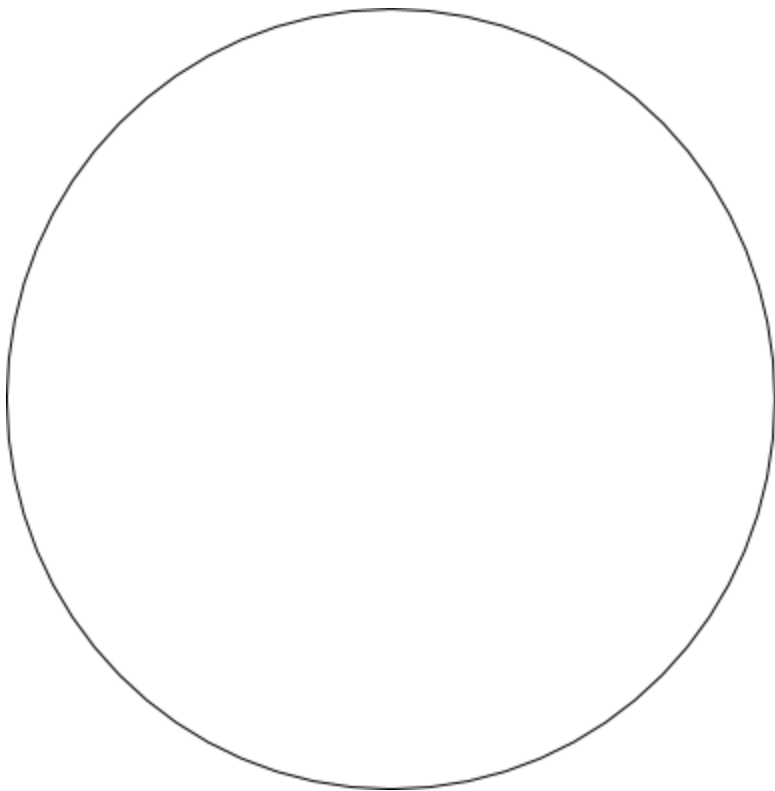
1. Find the percentage of accidental deaths from each of these causes, rounded to the nearest percent.

2. What percent of accidental deaths were from “other” causes?

3. Neatly create a well-labeled bar graph of the distribution of causes of accidental deaths. Be sure to include other causes



4. A pie chart is another graphical display used to show all the categories in a categorical variable relative to each other. Create a pie chart for the accidental death percentages.



Section 4: Use the following data to create a dot plot in the space provided.

The data below gives the number of hurricanes that happened each year from 1944-200 as reported by science magazine.

3	2	1	4	3	7	2	3	3	2	5	2	2	4	2	2	6	0	2
5	1	3	1	0	3	2	1	0	1	2	3	2	1	2	2	2	3	1
1	1	2	0	1	3	2	1	2	1	1	0	5	6	1	3	5	3	

Create a dot plot to display this data. Make sure you include appropriate labels, title, and scale.

**Section 5: Use the following data to create a stem plot.**

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 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 55 59 61 70 83 86 93

Make a stemplot using tens of dollars as the stem and dollars as the leaves. Make sure to include appropriate labels, titles and key

**Section 6: Use the following table to finish the table and create a histogram.**

The table gives the percentage of residents aged 65 or older in each of the 50 states

State	Percentage	State	Percentage	State	Percentage	State	Percentage
Alabama	13.1	Indiana	12.5	Nebraska	13.8	S. Carolina	12.2
Alaska	5.5	Iowa	15.1	Nevada	11.5	S. Dakota	14.3
Arizona	13.2	Kansas	13.5	N. Hamp.	12.0	Tennessee	12.5

Arkansas	14.3	Kentucky	12.5	N. Jersey	13.6	Texas	10.1
California	11.1	Louisiana	11.5	N. Mexico	11.4	Utah	8.8
Colorado	10.1	Maine	14.1	N. York	13.3	Vermont	12.3
Conn.	14.3	Maryland	11.5	N. Carolina	12.5	Virginia	11.3
Delaware	13.0	Mass.	14.0	N. Dakota	14.4	Washington	11.5
Florida	18.3	Michigan	12.5	Ohio	13.4	W. Virginia	15.2
Georgia	9.9	Minnesota	12.3	Oklahoma	13.4	Wisconsin	13.2
Hawaii	13.3	Mississippi	12.2	Oregon	13.2	Wyoming	11.5
Idaho	11.3	Missouri	13.7	Penn.	15.9		
Illinois	12.4	Montana	13.3	R. Island	15.6		

Histograms are a way to display groups of quantitative data into bins (the bars). These bins have the same width and scale and are touching because the number line is continuous. To make a histogram you must first decide on an appropriate bin width and count how many observations are in each bin. The bins for percentage of resident's age 54 or older have been started below for you. Finish the chart and create a histogram in the space to the right

Bin Widths	Frequency
4 to <6	1
6 to < 8	
8 to <10	

Section 7: Use the data below to find the statistics in the table then create the graph in the space provided.

**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 numeral 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.

**Section 8: Use the following to match the sampling design with the situation.**

The 7 types of sampling designs are:

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

1. 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.

2. What is the population of interest in the WW situation?

Section 9: Use the formula above and s

*Here is a formula that is used often in AP Statistics:  $z = \frac{x - \bar{x}}{s}$ . Use your algebra skills...*

1. If  $z = 2.5$ ,  $\bar{x} = 102$  and  $x = 100$ , what is  $s$ ? Show your work.

2. If  $z = -3.35$ ,  $x = 60$ , and  $s = 4$ , what is  $\bar{x}$ ? Show your work.

Section 10

1. The USDA reported that in 1990 each person in the United States consumed an average of 133 pounds of natural sweeteners. They also claim this amount has decreased by about 0.6 pounds each year.

- If 1990 could be considered "year 0", which of the above numbers represents the slope and which represents the y-intercept?
- What is the equation of the line of best fit using the slope and y-intercept above?
- Predict the average consumption of sweeteners per person for the year 2005.

2. The following equation can be used to predict the average height of boys anywhere between birth and 15 years old:  $y = 2.79x + 25.64$ , where  $x$  is the age (in years) and  $y$  is the height (in inches).

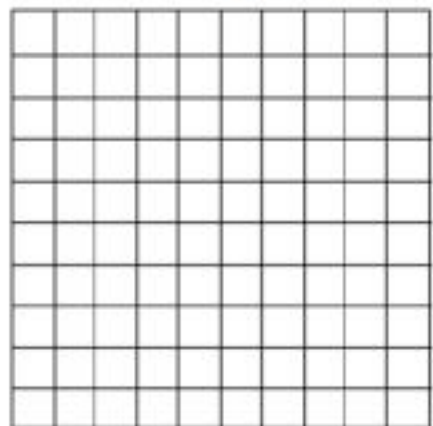
- What does the slope represent in this problem? Interpret it in the context of this problem/situation.
- What does the y-intercept represent in this problem? Interpret it in context.

## Section 11

Hilary wonders if people of similar heights tend to date each other. She measures herself, her dormitory roommate, and the women in the adjoining rooms; then she measures the next man each woman dates. Here are the data (heights in inches):

<u>Women:</u>	<u>66</u>	<u>64</u>	<u>66</u>	<u>65</u>	<u>70</u>	<u>65</u>
<u>Men:</u>	<u>72</u>	<u>68</u>	<u>70</u>	<u>68</u>	<u>74</u>	<u>69</u>

- Construct a scatterplot of the data.
- Describe the association between the heights of the women and the men they date.



## Section 12

1. A special lottery is to be held to select the student who will live in the only deluxe room in a dormitory. There are 100 seniors, 150 juniors, and 200 sophomores who applied. Each senior's name is placed in the lottery 3 times; each junior's name, 2 times; and each sophomore's name, 1 time. What is the probability that a senior's name will be chosen?

- A.  $\frac{1}{8}$       B.  $\frac{2}{9}$       C.  $\frac{2}{7}$       D.  $\frac{3}{8}$       E.  $\frac{1}{2}$

2. Which of the following has a probability closest to 0.5?

- A. The sun will rise tomorrow.  
B. It will rain tomorrow.  
C. You will see a dog with only three legs when you leave the room.  
D. A fair die will come up with a score of 6 four times in a row.  
E. There will be a plane crash somewhere in the world within the next five minutes.

3. If a coin is tossed twice, what is the probability that on the first toss the coin lands heads and on the second toss the coin lands tails? (Hint: What are the possible outcomes when you toss a coin twice?)

- A.  $\frac{1}{6}$   
B.  $\frac{1}{3}$   
C.  $\frac{1}{4}$   
D.  $\frac{1}{2}$   
E. 1

4. If a coin is tossed twice what is the probability that it will land either heads both times or tails both times?

- A.  $\frac{1}{8}$   
B.  $\frac{1}{6}$   
C.  $\frac{1}{4}$   
D.  $\frac{1}{2}$   
E. 1

5. Calculate the following probabilities and arrange them in order from least to greatest.

- I. The probability that a fair die will produce an even number. \_\_\_\_\_  
II. A random digit from 1 to 9 (inclusive) is chosen, with all digits being equally likely. The probability that when it's squared the answer will contain the digit 1. \_\_\_\_\_  
III. The probability that a letter chosen from the alphabet will be a vowel. \_\_\_\_\_  
IV. A random number between 1 and 20 (inclusive) is chosen. The probability that its square root will not be an integer. \_\_\_\_\_

ORDER: \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_



August, 2018

Dear Parents/Guardian,

I will be teaching your AP Statistics. I look forward to a new year with the students and hope to encourage them to not only to succeed but to enjoy math class. I hope to make math enjoyable for students through activities that get students engaged in their learning and provide applications to the real world. I plan to use different teaching styles to engage students in the learning process in a way



that will meet their individual needs. I will be providing the students with a syllabus, which will further outline course content, grading policy, extra help and resource to help your student succeed.

I hope that throughout the course I will have the opportunity to get to know your student and you. If at any point throughout the course you or your students need help or have any concerns feel free to contact me through phone or email. The school phone number is 843-764-2200, my email is [Robert.Sullivan@charleston.k12.sc.us](mailto:Robert.Sullivan@charleston.k12.sc.us). I will reply asap, please leave a name and number to reach you.

Thank you,

Mr. Robert T. Sullivan

## Classroom rules and expectations

I will be following and expecting the students to follow all CCSD rules and regulations. I also expect students to follow all rules within the R.B. Stall handbook set forth by the administration.

In my classroom I expect students to:

Come prepared to class

Be attentive within the classroom

Treat others with respect and kindness

Be ready and willing to learn

Attend to all rules in the class's social contract once complete

If these are not followed I will:

1<sup>st</sup>: Give the student a warning

2<sup>nd</sup>: Give the student a classroom write up

3<sup>rd</sup>: Call home to the parents of the student

4<sup>th</sup>: Send the student to the principal's office

Other information over the class, grading polices and how to contact me are outlined in the syllabus.

Once you have read the information in the syllabus and this letter I ask that you(the parent) and the student sign below in the space provided and return the bottom section to me.

Thank you,

Robert T. Sullivan

-----  
Parent signature: \_\_\_\_\_ Date: \_\_\_\_\_

Parent name (print): \_\_\_\_\_

Parent contact info: phone: \_\_\_\_\_ email: \_\_\_\_\_

Student signature: \_\_\_\_\_ Date: \_\_\_\_\_

Student name (print): \_\_\_\_\_