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June 2023

Dear Parents/Guardians of students entering AP Statistics,

This summer, your child will have the opportunity to prevent summer learning loss to be better prepared for success in AP Statistics. He or she will also have the opportunity to earn up to ten extra credit points on the first mathematics test of the 2023-2024 school year.

Note: The assignment is attached to this letter. In order to receive credit, students must show ALL written work and turn it in to their teacher by September 25, 2023.

Also, please do not wait until the end of summer to begin these skills.

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Part 1: Vocabulary List

Please define each of the following terms from the information on the stattrek website. When asked to provide an example of the word, provide a unique example of the word NOT given on the website.

1. Categroical Variables

   Example:

2. Quantitative Variables

   Example:

3. Univariate Data

4. Bivariate Data

5. Median

6. Mean

7. Population

   Example:

8. Sample

   Example:

9. Center

10. Spread

11. Symmetry

12. Unimodal and Bimodal

13. Skewness

Sketch Skewed left:

Sketch Skewed right:

14. Uniform

15. Gaps

16. Outliers

17. Dotplots

18. Difference between a bar chart and histogram

19. Stemplots

20. Boxplots

21. Quartiles

22. Range

23. Interquartile Range

24. Parallel boxplots

25. Difference between a frequency table and relative frequency table

26. Parameter

27. Statistic

28. Marginal Distribution

29. Conditional Distribution

30. Segmented Bar Chart

Part 2: Practice Problems

CATEGORICAL OR QUANTITATIVE

Determine if the variables listed below are *quantitative* or *categorical*.

1. Time it takes to get to school
2. Number of people under 18 living in a household
3. Hair color
4. Temperature of a cup of coffee
5. Teacher salaries
6. Gender
7. Smoking
8. Height
9. 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

STATISTIC – WHAT IS THAT?

A statistic is a number calculated from 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 has hit in each season from 1982 – 2001.

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

Mean	
Minimum	
Maximum	
Median	
Q1	
Q3	
Range	
IQR	

ACCIDENTAL DEATHS

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 3601 from fires. The rest were listed as "other" causes.

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

b. What percent of accidental deaths were from "other" causes?

c. NEATLY create a well-labeled **bar graph** of the distribution of causes of accidental deaths. Be sure to include an "other causes" bar.

d. 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. You may try using a software or internet source to make one and paste in the space below. (*Microsoft Excel works well*)

IT'S A TWISTA

The data below gives the number of hurricanes that happened each year from 1944 through 2000 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	3	0	1	3	2	1	2	1
1	0	5	6	1	3	5	3																

a. Make a dotplot to display these data. Make sure you include appropriate labels, title, and scale.

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 (round 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

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

WHERE DO OLDER FOLKS LIVE?

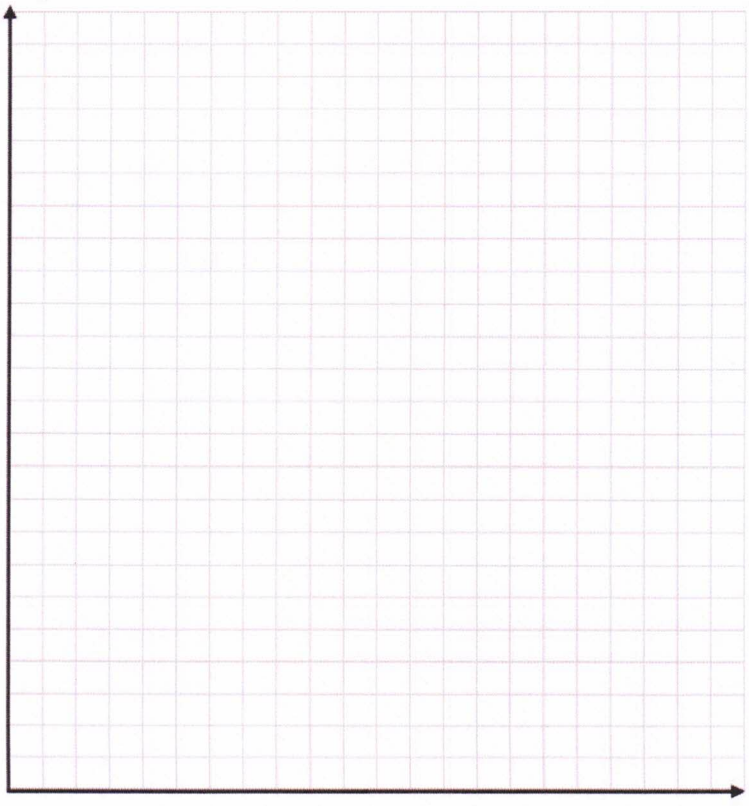
This table gives the percentage of residents aged 65 or older in each of the 50 states.

State	Percent	State	Percent	State	Percent
Alabama	13.1	Louisiana	11.5	Ohio	13.4
Alaska	5.5	Maine	14.1	Oklahoma	13.4
Arizona	13.2	Maryland	11.5	Oregon	13.2
Arkansas	14.3	Massachusetts	14.0	Pennsylvania	15.9
California	11.1	Michigan	12.5	Rhode Island	15.6
Colorado	10.1	Minnesota	12.3	South Carolina	12.2
Connecticut	14.3	Mississippi	12.2	South Dakota	14.3
Delaware	13.0	Missouri	13.7	Tennessee	12.5
Florida	18.3	Montana	13.3	Texas	10.1
Georgia	9.9	Nebraska	13.8	Utah	8.8
Hawaii	13.3	Nevada	11.5	Vermont	12.3
Idaho	11.3	New Hampshire	12.0	Virginia	11.3
Illinois	12.4	New Jersey	13.6	Washington	11.5
Indiana	12.5	New Mexico	11.4	West Virginia	15.2
Iowa	15.1	New York	13.3	Wisconsin	13.2
Kansas	13.5	North Carolina	12.5	Wyoming	11.5
Kentucky	12.5	North Dakota	14.4		

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 residents aged 65 or older have been started below for you.

a. Finish the chart of Bin widths and then create a histogram using those bins on the grid below. Make sure you include appropriate labels, title and scale.

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



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.

New Grading Policy

A new grading policy has been proposed by the dean of the College of Education for all education majors. All faculty and students in the college were asked to give their opinions about the new policy. The results are given below.

	Favor	Neutral	Opposed	Row Total
Students	353	75	191	619
Faculty	11	5	18	34
Column Total	364	80	209	653

a. State the variables and if they are categorical or quantitative.

b. What percent of responses were from students favoring the policy change?_____
What percent of students favored the policy change?_____
What percent favoring the policy change were students?_____

c. What is the marginal distribution of the grading policy change?

d. What is the distribution of the grading policy among just students?

e. What is the distribution of the grading policy among just falculty?

f. Create a segmented bar graph of students and faculty and their view on the proposed grading policy change.

Algebra Section:
The prerequisite for AP Statistics is Algebra II. You will find very much equation solving in this course, but some quick review of Algebra I and Algebra II content will be helpful.

Here is a formula that is used often in AP Statistics: $z = \frac{x - \bar{x}}{s}$

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

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

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.

It is expected that you have a thorough understanding of linear functions.

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.
    a. Write a linear equation that relates years since 1990 to the average consumption of natural sweeteners. Define your variables.

    b. What is the slope and what is the y-intercept?

    c. 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).

    a. What does the slope represent in this problem? Interpret it in context.

    b. What does the y-intercept represent in this problem? Interpret it in context.

You are expected to have a basic understanding of simple probability.

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?
   A. 1/6
   B. 1/3
   C. ¼
   D. ½
   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. 1/8
   B. 1/6
   C. 1/4
   D. 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 it will end with 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: _____, _____, _____, _____

Name: _____

Investigative Task- Can you roll your tongue??

Overview

This investigation focuses on examining the association between two categorical variables. Specifically, you will investigate whether there is an association between gender and whether a person can roll their tongue. As part of this investigation, you will collect, organize, and analyze data in a contingency table; construct and analyze segmented bar graphs; and calculate the percentages of males and females who can roll their tongue.

Task 1- Recording the Data

Your task begins with asking 50 people if they can or can't roll their tongue. Record tally marks below as you collect your data.

Males who can roll their tongue =

Males who can't roll their tongue =

Females who can roll their tongue =

emales who can't roll their tongue =

Task 2- Analyzing the Data

Your task is to construct a frequency table of the data you have collected. The categories have been listed our for you below.

Frequency Table

Possible Categories	Frequency (Count)	Relative Frequency (Percentage)
Male – Yes		
Male – No		
Female – Yes		
Female – No		
Total		

Contingency Table

	Yes- can roll tongue	No- can't roll tongue	Total
Male			
Female			
Total			

Task 3- Calculations and interpretations

Use the contingency table that you created to answer the following questions.

1. How many total people did you ask for this investigative task?
2. How many people can roll their tongue?
3. How many people are female?
4. How many people are male?
5. How many females can roll their tongue?
6. How many males can't roll their tongue?

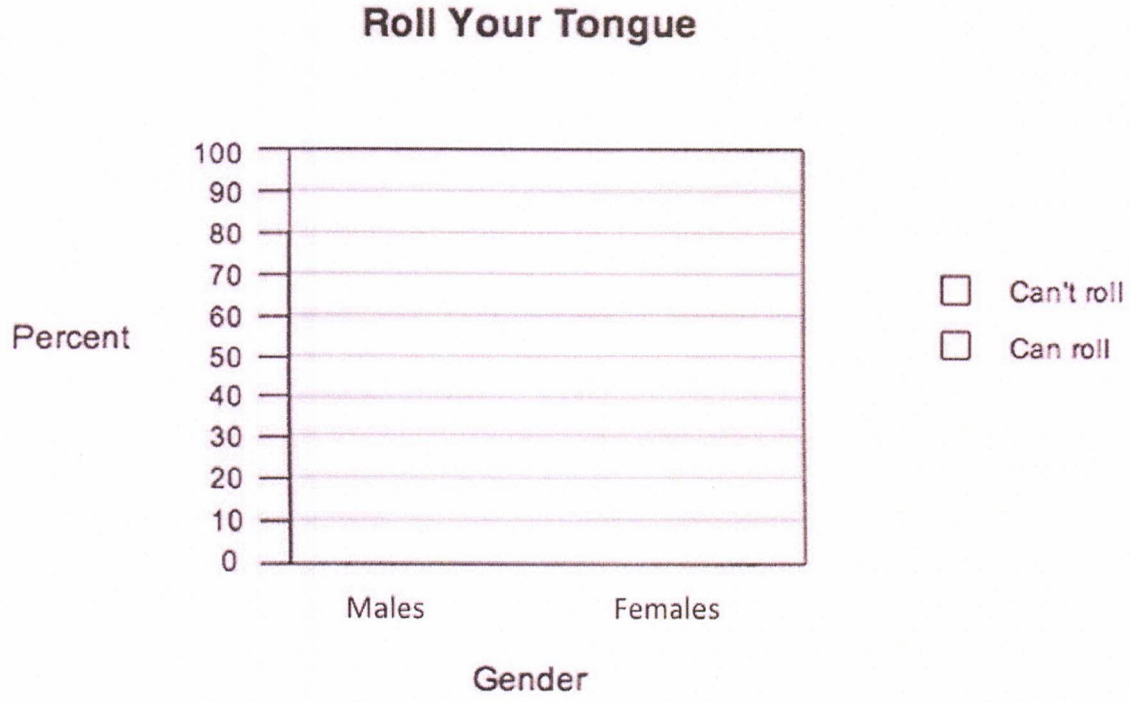
At this point, can we answer the question – Is gender associated with ability to roll one's tongue? Let's look at the percentages. Find the conditional distributions of ability to roll the tongue based on gender?

Relative Frequency Contingency Table

	Yes- can roll tongue	No- can't roll tongue	Total
Male			
Female			

Task 4- Visualize

Now, so that we can "see" the data a little more clearly, let's take our data and construct a segmented bar chart.



Investigative Task- Can you roll your tongue???

Referring back to your contingency table – answer the following questions.

7. What percentage of students can't roll their tongue?
8. What percentage of students are female that can't roll their tongue?
9. What percentage of females can't roll their tongue?
10. What percentage of students who can't roll their tongue are female?
11. What is the marginal distribution for gender?
12. What is the conditional distribution of students who can roll their tongue based on gender?

Task 5- More Visualization

Finally, let's try to visualize it one other way – a pie chart. Using your percentages from either your segmented bar chart or your relative frequency contingency table, create a pie chart. Be sure to include a key.