AP Statistics Summer Assignment

Introduction

This assignment is expected to be done over multiple days in the summer. If you are reading this the day before school starts, then you will have a very long day ahead of you. *This summer assignment requires internet access.* The assignments will help me learn more about you and assess how much you already know about introductory statistics and also learn what kind of data you are interested in learning how to analyze.

The assignment is due on Monday, August 18, 2017.

Part 1: Special Problem

Your first Special Problem is to write a two-page document on the computer, using a word processing package of your choice.

Content

- The first paragraph should be a brief autobiographical statement about yourself that will help me get to know you. What are your likes and dislikes? Who are your role models? What makes you unique?
- In the second paragraph, tell me something you remember from a previous math course. It can be a particularly good experience or a particularly bad experience. Or describe a math teacher you've had who stood out in some way.
- In the third paragraph, tell me about your plans for college. If you are thinking about a particular major, tell me about that and why you are interested in that field. Alternatively, tell me about possible career interests in general terms.
- In the fourth paragraph tell me something about this statistics course. Possible areas to address: Why are you taking AP Statistics? Is statistics an important tool in the field of study you are considering? Have you had any previous connection with statistics? Can you give an example from the "real world" where statistics is or has been important to you personally?
- In fifth and final paragraph, explain why high school students should take a statistics class and what you hope to gain from taking this course. Use evidence from the following sources to make your case:
    - o http://www.ted.com/talks/lang/eng/arthur_benjamin_s_formula_for_changing_math_education.html
    - o http://www.wired.com/magazine/2010/04/st_thompson_statistics/

Word Processing Requirements

- In order to demonstrate knowledge and facility with certain features of your word processor, after you finish writing your paper, I want you to:
- Change the font to Times New Roman (if this is not available on your computer, use a simple newspaper-type font; not like this font). Make your font size 12 points.
- Make the first line "Brief Autobiographical Sketch," and make the second line (the title) your name. Center both lines, and change your name to font size 18.
- Insert the following paragraph headings, in order: Biographical, Retrospective, College, AP Statistics, and Why Statistics? like the paragraph headings I have used on this sheet, and then put these words in **bold**.
- Leave one line of space between the title and the first paragraph, and leave one line between paragraphs.
- Put something (or some things) in *italics*, and underline something else.
- Number your page at the bottom of the page, centered.
- Before you print the final copy, make sure you proofread your paper on the screen, and then check it for spelling and syntax.

Part 2: Vocabulary

You will use a free online Statistical tutoring site that will give you information on variables and data displays. While reviewing the information on the site you will be completing a vocabulary flash cards on 3x5 cards (see page 2 and 3). Follow the steps below: Go to www.stattrek.com Click on "AP Statistics" then "AP Tutorial" On the left side of the screen is a list of general topics. Under each general topic are a list of subtopics. You will read the subtopics to complete the vocabulary list. This does not have to be typed, but must be legible.

1. Categorical Variables (Define and provide an ex*ample*)

2. Quantitative Variables (Define and provide an ex*ample*)

3. Discrete Variables

4. Continuous

5. Univariate Data

6. Bivariate Data

7. Median

8. Mean (Define and include formula)

9. Population (Define and provide an ex*ample*)

10. Sample (Define and provide an ex*ample*)

11. Center

12. Spread

13. Symmetry (Define and draw a sketch)

14. Unimodal (Define and draw a sketch)

15. Bimodal (Define and draw a sketch)

16. Skewness ((Define and draw a sketch representing *Skewed left and Skewed right*)

17. Uniform (Define and draw a sketch)

18. Gaps (Define and draw a sketch)

19. Outliers (Define and draw a sketch)

20. Dotplots (Define and draw a sketch)

21. Bar chart (Define and draw a sketch)

22. Histogram (Define and draw a sketch)

23. The difference between a bar chart and histogram

24. Stemplots (Define and draw a sketch)

25. Boxplots (Define and draw a sketch)

26. Quartiles

27. Range

28. Interquartile Range

29. Parallel boxplots

30. Parameter

31. Statistic

32. Standard Score (z-score) [include formula]

33. Variance (include formula)

34. Standard Deviation (include formula)

35. Types of graphs that can be used for comparing data

Part 3: Describing and Displaying Data Instructions

Preparations for the AP test starts NOW!! Practice writing about your statistical thinking. Your success on the AP Exam depends on how well you explain your reasoning.

Note: You should practice these skills on your everyday homework and classwork, just as you would on the exam. One thing to always remember – you "perform" just like you practice.

On problems where you have to produce a graph:
- Label and scale your axes! Do not copy a calculator screen verbatim onto the test.
- Don't refer to a graph on your calculator that you haven't drawn. Transfer it to the exam paper. This is part of your burden of good communication.

Communicate your thinking clearly.
- When you finish writing your answer, look back. DID YOU ADDRESS THE CONTEXT OF THE PROBLEM? Does the answer make sense?
- Organize your thoughts before you write, just as you would for an English paper.
- Write efficiently. Say what needs to be said, and move on. Don't ramble. That being said, remember that the burden of communication is on you. Don't leave it to the reader to make inferences.
- Avoid bringing your personal ideas and philosophical insights into your response.

About graphing calculator use:
- Do not write directions for calculator button-pushing on the exam!
- Avoid calculator syntax, such as *normalcdf* or *1-PropZTest*. Instead say "On my calculator I determined that the probability of a score being 1.5 standard deviations above the mean or below is equal to 93.32%"

Follow directions. If a problem asks you to "explain" or "justify," then be sure to do so.
- Don't "cast a wide net" by writing down everything you know, because you will be graded on everything you write. If part of your answer is wrong, you will be penalized.
- Don't give parallel solutions. Decide on the best path for your answer, and follow it through to the logical conclusion. Providing multiple solutions to a single question is generally not to your advantage. You will be graded on the lesser of the two solutions. Put another way, if one of your solutions is correct and another is incorrect, your response will be scored "incorrect."
- The amount of space provided on the free-response questions does not necessarily indicate how much you should write.
- If you cannot get an answer to part of a question, make up a plausible answer to use in the remaining parts of the problem.

Part 3: Displaying & Describing Data

Marvel Comics Superheros	Gender	Eyes	Hair	Height	Weight	First Appeared
Black Cat	Female	Green	Blonde	5'10"	120	1979
Captain America	Male	Blue	Blonde	6'2"	240	1941
Daredevil	Male	Blue	Red	6'0"	200	1964
Dark Angel	Female	Green	Red	5'7"	120	1992
Deadpool	Male	Brown	None	6'2"	210	1990
Elecktra	Female	Blue	Black	5'9"	130	1981
Human Torch	Male	Blue	Blonde	5'10"	170	1961
Iceman	Male	Brown	Brown	5'8"	145	1963
Invisible Woman	Female	Blue	Blonde	5'6"	120	1961
Iron Man	Male	Blue	Black	6'1"	225	1963
Mr. Fantastic	Male	Brown	Brown	6'1"	180	1961
Ms. Marvel	Female	Blue	Blonde	5'11"	124	1967
Phoenix	Female	Green	Red	5'6"	115	1963
Silver Surfer	Male	Silver	None	6'4"	225	1969
Spider-man	Male	Hazel	Brown	5'10"	167	1962
Spider-woman	Female	Green	Black	5'10"	130	1977
Storm	Female	Blue	White	5'11"	127	1976
The Black Widow	Female	Blue	Red	5'7"	135	1962
Thing	Male	Blue	None	6'0"	500	1961
Thor	Male	Blue	Blonde	6'5"	640	1951
Venus	Female	Blue	Blonde	5'6"	280	1948
Wolverine	Male	Blue	Black	5'3"	195	1974

1. Determine which data is categorical and which data is quantitative.

2. Create a bar graph of hair color.

3. Construct a stemplot that displays the first appeared data. Let 194| represent the stem.

4. Create a new column for "age" on the original table of data. Determine the "age" of each superhero.

    a. Construct a dotplot to display this data. Include appropriate labels, title, and scale.

    b. Compare the display from the stemplot in #3 and dotplot in 4a. How are they similar? Different?

5. Explore the weights of all superheroes.

    a. Determine the maximum weight.

    b. Determine the minimum weight.

    c. What is the range of weights?

    d. Determine the median weight.

    e. Determine the first quartile (Q1). (Middle between the minimum and median)

    f. Determine the third quartile (Q3). (Middle between the median and maximum)

    g. What is the interquartile range (IQR) of the weights? Hint: find the difference between Q3 and Q1.

    h. Determine any outliers.

        i. Lower boundary: Q1 – 1.5(IQR)

        ii. Upper boundary: Q3 + 1.5(IQR)

    i. Construct a modified boxplot to display the distribution of weight for superheroes. Be sure to indicate any outliers.

6. Convert all heights to inches (i.e. 5'3" = 63"). Determine each measure of central tendency.

    a. Mean $(\bar{x})$

    b. Median

    c. Mode

    d. Which measure or measure(s) of central tendency best describes the typical height of the superheroes?

7. Suppose The Hulk was included in the original data. When angered he can grow to be 96 inches tall. Determine the new measures of central tendency:

    a. Mean $(\bar{x})$

    b. Median

    c. Mode

    d. Which measure of central tendency was most affected by the Hulk? Which measure of central tendency best describes the typical height of the superheroes in this situation? Explain your reasoning.