AP Statistics
Summer 2017 Assignment – *due the first day of school*

I am pleased you have chosen to take AP Statistics next year. I suspect you'll enjoy the course, and learn entirely new ways to think about numbers and data. Statistics is the study of data (as opposed to probability, which is the study of odds and likelihoods – we'll study both). We'll spend the year analyzing data, designing experiments and surveys, calculating probabilities, and testing outcomes.

Summer work in AP courses is simply a necessity. We start the school year so very late compared to most other schools in the country, and we need to complete the curriculum in time for the AP exam. This assignment is meant to be painless. However, it is absolutely required. You will earn your first grade of the year with the quality completion and submission of this assignment on the first day of school.

A calculator can be used for the probability portion of this assignment. You will be required to have a graphing calculator every day, at every class. There is no portion of this course during which you are not permitted to use your calculator.

The assignment has **four** sections:

1) One of the best and most entertaining books about *conditional probability* is <u>Bringing Down the House: The Inside Story of Six M.I.T. Students Who Took Vegas for Millions,</u> by Ben Mezrich. You will READ the book and write a **brief** essay. **One page, typed, 12-point typeface** (there is more writing in AP Statistics than in any other math class, by the way).

> **Using SPECIFIC examples from the book, explain how the blackjack teams leveraged CONDITIONAL probability to make money playing blackjack. Though they did not always win, how is it they were consistently profitable?**

Remember, your essay should include <u>specific examples</u> from the book. I am very good at identifying essays written by people who haven't actually read the book. I recommend reading Kevin's essay at the back of the book, which will help you with the question. YOU WILL LOVE THIS BOOK…just try it.

Here's a link to the book at Barnes & Noble. I assure you they have it in stock online and at the store.

http://www.barnesandnoble.com/w/bringing-down-the-house-ben-mezrich/1103440011?ean=9780743249997

2) You will watch FOUR videos. Be prepared to talk about them the first day of school. Links to the videos are found on my teacher webpage or below.
   a. Go to hvrsd.org
   b. Under STAFF – click on staff directory.
   c. Type in Mr. Shrager's name.
   d. Click on the link for my website.
   e. Click on AP STATISTICS and get the video link

Or get them here:

Summer 2017 AP Statistics Videos to watch…

Arthur Benjamin: Teach statistics before calculus!
http://www.youtube.com/watch?v=BhMKmovNjvc&list=PL6D412F07E66207FF&index=9

Hans Rosling's 200 Countries, 200 Years, 4 Minutes - The Joy of Stats - BBC Four
http://www.youtube.com/watch?v=jbkSRLYSojo&list=PL6D412F07E66207FF&index=10

Hans Rosling: Religions and babies
http://www.youtube.com/watch?v=ezVk1ahRF78&list=PL6D412F07E66207FF&index=11

The Strange Powers of the Placebo Effect
https://www.youtube.com/watch?v=yfRVCaA5o18

There are many more entertaining statistics videos that you can find on my youtube channel: www.youtube.com/MrAPStatistics. We'll watch quite a few of these videos throughout the school year.

3) Read this article from the fivethirtyeight.com website: How To Spot A Front-Runner On The 'Bachelor' Or 'Bachelorette' https://fivethirtyeight.com/features/the-bachelorette/?src=obsidebar=sb_1 (this is an awesome website, by the way, filled with data-driven news and analysis. I highly recommend it).

   This is a comprehensive statistics-driven article about the likelihood for success on the tv show the Bachelor (or Bachelorette). Note that by the time you read this article, more episodes of this show will have aired. Also please know that Mr. Shrager has not watched this program in over a decade, and even then, he did not watch it religiously.   That's okay. Let's think about the big picture.

   Write a paragraph or two explaining how the author used the receipt of a **rose** to predict success on the show. Does receiving a certain rose at a certain time **prove** anything? Look at the Date Rose Advantage graph (at the very end of the article). This kind of cumulative graph is called an ogive in statistics. Discuss what this graph implies after receiving (or not receiving) a date rose.

   HAVE FUN WITH THIS! IT'S A REALITY TV SHOW!

4) Complete the following **ten** probability problems. Unlike the other parts of this assignment, you are **NOT supposed to get most (or any) of these correct**. Simply try your best and DO NOT do any research or look up any formulas. I suspect that most of you will get **four or fewer** of these right. Even if you get none of them correct, that's okay. Just try (and show work where applicable). Do all work and write all answers on the attached answer sheet. I need to give you a pre-assessment for a topic we will learn this year. This is that pre-assessment (and we'll spend the entire second marking period on probability).

a) What is the probability of flipping a fair coin 10 times in a row and getting heads all ten times (you can leave an exponent in your answer, or use scientific notation).

b) What is the probability of randomly selecting 3 cards from a standard 52-card deck of cards, without replacement, and having all three cards be "nines."

c) The probability that I randomly select a female from one of my 2013-2014 AP Stats classes is 27/64. The probability that I randomly select somebody wearing glasses is 17/64. The probability that I randomly select a girl wearing glasses is 9/64. If I select a student at random, what is the probability that the student is either a girl or is wearing glasses?

d) Missiles fired from a rocket launcher are independent of one another. Given that we have a 30% probability that any given missile hits an extremely distant target, if seven missiles are fired, what is the probability that AT LEAST ONE of them hits the distant target?

e) Missiles fired from a rocket launcher are independent of one another. Given that we have a 30% probability that any given missile hits an extremely distant target, if seven missiles are fired, what is the probability that THREE OR MORE of them hits the distant target?

f) The probability that a randomly selected student in the cafeteria has purchased pizza is 0.30. The probability that a randomly selected student has purchased ice cream is 0.35. The probability that a randomly selected student has purchased both pizza and ice cream is 0.05. We selected a student and find that he has purchased pizza. What is the probability that he has also purchased ice cream?

g) Christina is late to class 35% of the time. She has an iced coffee with her in class 40% of the time. She is late and has an iced coffee with her 25% of the time. Assuming that her behavior with regard to these matters is independent day-to-day, what is the probability that on a randomly selected day Christina is either late to class or has an iced coffee (or both?).

h) A college will offer free applications (they will waive the application fee) for all applicants who score in the top 8% of the SAT verbal section. Assume the mean SAT verbal score is 500 with a standard deviation of 100, what is the cut-off score for the application fee waiver? (although SAT scores end with a zero, your answer shouldn't necessarily)

i) An incipient form of cancer occurs in three out of every 1000 Americans. To provide early detection, a screening test has been developed that rarely errs. Among healthy patients, only 5% get a + reaction (false alarm). Among patients with this incipient cancer, only 2% get a − reaction (missed alarm).

If this test is used to screen the American public, all those who get a + reaction will be hospitalized for exploratory surgery. What proportion of these people, who are thought to have cancer, will *actually* have cancer?

j) The Giants score an average of 37 points per game with a standard deviation of 9 points. The Ravens score an average of 31 points per game with a standard deviation of 6 points. Assuming that the scores for each team are normally distributed, and that no other factors matter (like defensive matchups or injuries), on any randomly selected day when these two teams are playing each other, what is the probability that the Ravens beat the Giants?.

ANSWERS: SPACE TO SHOW WORK (you may attach extra paper)

a)_____

b)_____

c)_____

d)_____

e)_____

f)_____

g)_____

h)_____

i)_____

j)_____