

AP Statistics Summer Assignment

How to Lie with Statistics ('93 Reissued Edition), Huff, Darrell W.W. Norton & Co.
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For a number of reasons, AP Statistics is unlike every other mathematics course that you have taken thus far. This summer assignment will highlight a few of these reasons and it will introduce you to the importance and usefulness of the subject. The assignment is based on the book *How to Lie with Statistics* by Darrell Huff. It's a classic, first published in 1954, but you will soon see that the ideas in the book are very relevant today. Please be prepared to submit this assignment on the second day of class when we meet in September. This assignment must be **typed**.

*Please note that you will be making **heavy** use of your graphing calculator in AP Statistics. It is very important for you to have a TI-83 (or TI-84) calculator for the class, and to bring it every day. If you do not already have a TI-83 or 84, you must get one before the first day of class.*

1. List as many sources of sample bias as you can that are mentioned in Chapter 1 and provide an example of each.
2. What is the advantage of a stratified random sample and what difficulties does it pose, according to Chapter 1?
3. In Chapter 1, the author suggests that most polls are biased in the direction of the *Literary Digest* error.
 - a. What incident does this refer to?
 - b. That incident took place during (and arguably because of) the Great Depression. Are the lessons learned from that still relevant for us today? Why?
 - c. In what direction is that bias?
4. In Chapter 2, different types of averages were discussed. When we see an average reported, what do we need to ask besides which kind of average is being used? Why?
5. Describe a situation different from the ones in the book where it would be appropriate to report:
 - a. an arithmetic average
 - b. a median
 - c. a mode
6. Chapter 3 is titled "The Little Figures That Are Not There." This chapter discusses at least five different kinds of information that may be missing when we are faced with a claim based in data. Using this information, construct a list of questions that one should consider when presented with a claim based in data.
7. Consider the example in Chapter 3 about an advertising agency's business. How can the graph of the advertising agency's business be misleading when the graph clearly shows such an upward trend?
8. In Chapter 4, the author suggests that some reported differences may not be real differences at all and others, even though they can be shown to be real differences, should still be ignored. Explain how each of these two situations can arise and give an example of each.

9. Define a semi-attached figure. Identify some general strategies from Chapter 7 for using a semi-attached figure.

10. Here is an excerpt from a guest commentary column in the Santa Maria Times by Ron Fink (May 17, 2005). Identify as many semi-attached figures you can.

The North [Santa Barbara] County routinely meets state air quality standards and the South Coast does not. Why is that? ... The South Coast doesn't have any more industrial pollution emitters than does the north. Failure to meet the standard may be connected to the 71 tons of methane that is released daily from natural seeps off of our coastline, not any human activities. You see, the instruments used to measure air contaminates [sic] cannot discriminate between natural and man-made pollutants.

Nature is not perfect when judged by man's rules for polluting the environment. Anyone with a pollen-associated sinus problem can readily attest to the impact that nature has on our daily lives.

And what about those greenhouse gases, the purported cause of global warming, where do they come from? A major source is volcanoes.... Satellite data after the 1991 eruptions of Mt Pinatubo (the Philippines) and Mt Hudson (Chile) showed a 15-20 percent ozone loss at high latitudes and a greater than 50 percent loss over the Antarctic! ... The U.S. Geological Survey determined that: globally, large volcanic explosive eruptions that inject a tremendous volume of sulfur aerosols into the stratosphere can lead to lower surface temperatures and promote depletion of the Earth's ozone layer. Ash from such events [as the Mt St Helens eruptions] can travel 100 miles or more downwind!

So despite what editorial writers, local environmentalists and movie makers want you to believe, its [sic] nature that is responsible for the greatest changes in nature, not human activity or President Bush's environmental policies. I have often wondered how we mere humans could equal the magnitude of pollution created by nature no matter how many oil wells we drill, power plants we build, air-conditioners we operate, hair spray we use, cars we paint or SUV's we drive.

11. Name two variables that you suspect would have correlation if we collected data, but for which a cause and effect relationship does not exist. (Hint: think of a common causal factor first, then select your two variables.) Be creative and make it as outrageous as possible.

12. Comment briefly on each of the following reports.

a. Teen drug use linked to truancy

Press Association

Tuesday July 29, 2003

Truants are more than five times as likely to take drugs than other schoolchildren, according to research published today. The survey found that 35% of pupils who had ever played truant admitted they had taken drugs in the last month, compared with just 6% who had not skipped school. The study of 10,000 schoolchildren aged 11 to 15 also found that truants were far more likely to regularly drink alcohol and smoke.

b. 20 November, 2003

Low self-esteem 'shrinks brain'

By Pallab Ghosh BBC Science Correspondent

People with a low sense of self worth are more likely to suffer from memory loss as they get older, say researchers. The study, presented at a conference at the Royal Society in London, also found that the brains of these people were more likely to shrink compared with those who have a high sense of self esteem. Dr Sonia Lupien, of McGill University in Montreal surveyed 92 senior citizens over 15 years and studied their brain scans. She found that the brains of those with low self-worth were up to a fifth smaller than those who felt good about themselves. These people also performed worse in memory and learning tests.

13. Chapter 9 discusses “statisticulation.” Why are percentages so often a source of statisticulation?

14. Chapter 10 discusses how to be intelligent consumers of statistical information. If a respectable organization is cited as a source of a statistic, what do we still need to consider about that authority?

15. Describe some of the critical things that are commonly missing when a statistic is reported in the media.

16. Summarize the five questions we can ask to defend ourselves as a consumer of statistics. (Explain briefly what each question represents.)