Broadneck High School

AP Statistics Summer Assignment

2019 - 2020
Welcome to AP Statistics!

We are very excited that you have chosen to study a challenging mathematics course unlike any other. Advanced Placement Statistics is a rigorous, college-level course intended to prepare students for the College Board’s AP Statistics Exam in May 2020. This course will no doubt be strikingly different from previous mathematics courses you have taken. Careful reading and detailed writing are integral parts of the course. Rest assured, we will work very hard, and we will have fun as we do so!

The purpose of this Summer Assignment is to:

1. Give you information on what to expect, how this course is different from other math courses, and what materials you will need.
2. Refresh your knowledge/introduce you to statistical terminology to prepare you for the higher level statistics material we will cover.

REQUIRED materials you should have prior to the first class:

1) **REQUIRED:** Graphing calculator! (TI-83 or TI-84 PLUS) We will use a graphing calculator almost every day in class, on homework, and on the entire AP Exam!
2) A large binder to organize your course materials. Consider getting dividers to separate notes, classwork, graded assignments, MC and FRQ practice.
3) A small binder or folder that will be used as a portfolio. This must have three-rings, and have enough space for roughly 50 pieces of paper.
4) A great work ethic and a positive attitude!

Please complete the following THREE STEPS by hand writing your response on college ruled paper. Responses will be collected on the first day of class.

**TYPED RESPONSES WILL NOT BE ACCEPTED**

We look forward to working with each of you this school year! Have a great summer!

Sincerely, Your AP Statistics Teachers

*Helpful Resources:*
2. Stattrek.com, [http://www.stattrek.com/](http://www.stattrek.com/), is a useful website for reviewing concepts that you may have forgotten.
3. Also [http://apstatsmonkey.com/StatsMonkey/Statsmonkey.html](http://apstatsmonkey.com/StatsMonkey/Statsmonkey.html) is another site with good statistics resources.
4. [https://www.khanacademy.org/](https://www.khanacademy.org/) is a site where you can find many videos covering all topics in this packet as well.
AP STATISTICS SUMMER ASSIGNMENT

Step 1: AP Statistics and the AP Exam

Gain access to AP Statistics page on The College Board website, and answer the questions below.

Link: https://apstudent.collegeboard.org/apcourse/ap-statistics

1) What is AP Statistics?
2) What are the four main concept areas that we will study? Describe each concept.
3) Find the list of “College Majors.” Are there any majors you are interested in that involve statistics? Pick one or two majors and describe how statistics is used in each major.
4) Find the list of “Career Areas.” Pick two to three Career Areas that you might be interested in, and describe how statistics is used in those areas.

Regarding the AP Exam, you will be expected to answer Multiple Choice and Free Response questions.

5) How many Multiple Choice questions are there? Free Response?
6) What percentage of your AP Exam score is the Multiple Choice worth? Free Response?
7) How much time do you get for each section?
8) Can you use a calculator? If so, on which parts? And what calculators are acceptable?

Step 2: YOU!

In this section, you will describe yourself as a student/learner.

9) What are your strengths as a student? What are some areas of improvement?
10) What is your math background? (schools, classes, grades, teachers, etc.)
11) What kind of learner are you? Visual/kinesthetic? Do you work better individually or in a group?
12) Write two goals you have for this school year, and two goals you have for AP Statistics.

Step 3: Chapter 4 Introduction

Most of the course is centered on RANDOMNESS and SAMPLING. You must also be able to distinguish between a population and sample. Throughout the course, we will use sampling methods to approximate/estimate information about a population.

13) Describe the difference between a population and a sample.
14) Describe the similarities and differences of a parameter and a statistic.
15) Explain each of the following type of bias that might occur when sampling: Undercoverage bias, nonresponse bias, response bias, wording of the question bias
16) Define the following sampling methods, and discuss whether they are biased or unbiased: Voluntary Response, Convenience, Simple Random, Stratified, Cluster, Multistage, Systematic
Use the following scenario to identify the population, sample, parameter and statistic.

17. A publisher is interested in determining the reading difficulty of math textbooks. Reading difficulty is determined by the length of sentences and the length of words used in the text. Researchers randomly select 10 paragraphs out of the most popular Algebra 1 textbooks and calculate the average sentence length and average word length for that type of math textbook.

Use the following scenario to determine which of the 7 sampling methods best describes questions 18 through 24. List the answer, along with an explanation of why you chose that method.

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.

18. Randomly select 10 members from each of the Weight Watchers centers in the Maryland division.
19. Use an alphabetical listing of all Maryland division members. Randomly choose a starting person on the list. Then select every 20th person thereafter.
20. Randomly select 2 or 3 branches of the Maryland division and survey every member of that center.
21. Send out the survey to every member of the Maryland division. Place drop boxes in each Weight Watchers center. Anyone who returns a survey will be in the sample.
22. The Maryland regional office is in Baltimore so they survey members at the Weight Watchers center in Baltimore.
23. From a numbered list of all Maryland division members use a computer to randomly select 100 numbers and then survey all members with those corresponding numbers.
24. First divide the U. S. into 4 Regions, then randomly select 2 states from each region. Then randomly select one county from each state, and then interview everyone in the selected county.

A main topic from the AP Statistics course is called “Experimental Design.” In this section, we will discuss the difference between an observational study and an experiment, and how to properly design them.

25. Describe the difference between an observational study and an experiment.
26. Define the following terms: explanatory variables, response variables, confounding variables, experimental units, subjects, factors, treatments, control, random assignment, replication, placebo, double-blind, statistically significant, block, completely randomized design, randomized block design, matched pairs design

Use the following scenario to answer question 27 – 29.

Does shoe size affect spelling ability? A recent study was conducted in a suburban school district to answer this question. 30 students from grades 1 through 8 were randomly selected. Each student was administered a spelling test and had his or her feet measured. Test scores were plotted against shoe size and a strong, positive relationship was observed.

27. Was this an observational study or experiment? Why?
28. What are the explanatory and response variables?
29. Suggest a possible confounding variable in this setting. Explain carefully how it may confound the results.
Use the following scenario to answer 30 – 32.

Your AP Stat teacher teaches 150 total students. They are interested in knowing whether listening to classical music while studying results in higher test scores than listening to no music. They wish to design an experiment to answer this question.

30. What are the experimental units, explanatory variable, treatments, and response variable?
31. What other potential variables could confound the results in this situation? How could they affect the results? How could we avoid their effects?
32. How could blocking be used in this scenario?

Answer the following multiple choice questions #33 – 40 with only the letter choice. You do not need to provide an explanation.

33. A researcher is testing a company’s new stain remover. He has contracted with 40 families who have agreed to test the product. He randomly assigns 20 families to the group that will use the new stain remover and 20 to the group that will use the company’s current product. The most important reason for this random assignment is that:
   (A) Randomization makes the analysis easier since the data can be collected and entered into the computer in any order
   (B) Randomization eliminates the impact of any confounding variables
   (C) Randomization is a good way to create two groups of 20 families that are as similar as possible.
   (D) Randomization ensures that the study is double-blind
   (E) Randomization reduces the impact of outliers

34. A large suburban school wants to assess student attitudes towards their math textbooks. The administration randomly selects 15 mathematics classes and gives the survey to every student in the class. This is an example of a:
   (A) Multistage sample
   (B) Stratified sample
   (C) Cluster sample
   (D) Simple Random sample
   (E) Convenience sample

35. 100 volunteers who suffer from anxiety take part in a study. 50 are selected at random and assigned to receive a new drug that is thought to be extremely effective in reducing anxiety. The other 50 are given an existing anti-anxiety drug. A doctor evaluates anxiety levels of those who take the new drug. This would be double blind if:
   (A) Both drugs looked the same
   (B) Neither the subjects nor the doctor knew which treatment any subject had received
   (C) The doctor couldn’t see the subjects and the subjects couldn’t see the doctor
   (D) There was a third group that received a placebo
   (E) All of the above
36. To determine employee satisfaction at a large company, the management selects an SRS of 200 workers from the marking department and a separate SRS of 50 workers from the sales department. This kind of sample is called a:

(A) Simple Random sample
(B) Simple Random sample with blocking
(C) Multistage Random sample
(D) Stratified Random sample
(E) Random Cluster sample

37. The Web portal AOL places opinion poll questions next to many of its news stories. Simply click your response to join the sample. One of the questions in January 2008 was, “Do you plan to diet this year?” More than 300,000 people responded, with 68% saying “Yes.” You can conclude that:

(A) About 68% of Americans planned to diet in 2008
(B) The poll used a convenience sample, so the results tell us little about the population
(C) The poll uses voluntary response, so the results tell us little about the population
(D) The sample is too small to draw any conclusion
(E) None of these

38. A local news agency conducted a survey about unemployment by randomly dialing phone numbers until they gathered responses from 1000 adults in their state. In the survey, 19% of those who responded said they were not currently employed. In reality, only 6% of the adults in the state were not currently employed at the time of the survey. Which of the following best explains the difference in the two percentages?

(A) The difference is due to sampling variability. We shouldn’t expect the results of a random sample to match the truth about the population every time.
(B) The difference is due to response bias. Adults who are employed are likely to lie and say that they are unemployed.
(C) The difference is due to undercoverage bias. The survey included only adults and did not include teenagers who are eligible to work.
(D) The difference is due to nonresponse bias. Adults who are employed are less likely to be available for the sample than adults who are unemployed.
(E) The difference is due to voluntary response. Adults are able to volunteer as a member of the sample.

39. A nutritionist wants to study the effect of storage time (6, 12, and 18 months) on the amount of vitamin C present in freeze dried fruit when stored for these lengths of time. Six fruit packs were randomly assigned to each of the three storage times. The treatment, experimental unit, and response are respectively:

(A) A specific storage time, amount of vitamin C, a fruit pack
(B) A fruit pack, amount of vitamin C, a specific storage time
(C) Random assignment, a fruit pack, amount of vitamin C
(D) A specific storage time, a fruit pack, amount of vitamin C
(E) A specific storage time, six fruit packs, amount of vitamin C

40. Congrats! You are done the AP Statistics Summer Assignment for 2019 – 2030. The answer to #40 is A, which represents your effort and attitude going into this course!