

## Section 5A: Homework Solutions

For the following, describes the population, sample, population parameters, and sample statistics.

**16.** Astronomers typically determine the distance to a galaxy by measuring the distances to just a few stars within it and taking the mean of these distance measurements.

**Solution:**

Population: all stars in the galaxy

Sample: the stars selected for measurement

Parameters: mean of distances between all stars and the Earth

Sample Statistics: mean of distances between the stars in sample and the Earth.

□

**19.** A nationwide Harris poll of 1010 adults surveyed by telephone revealed that the professions viewed by the public as more prestigious are doctor, scientist, teacher, and minister/clergy.

**Solution:**

Population: all adult Americans

Sample: 1010 selected adults

Parameters: rankings of professions by all adult Americans

Sample Statistics: rankings of professions by those in sample

□

**23.** Describe how you would apply the five basic steps of a statistical study to the following issue:

You want to know the mean height of adult American women

**Solution:**

This response may vary from person to person, but the overall outline should be similar to the following:

Step 1: population is all adult American women; goal is to determine mean height of these women.

Step 2: Choose a representative sample.

Step 3: Determine mean height for those in sample.

Step 4: Infer mean height for all adult American women.

Step 5: Assess results; formulate conclusion.

□

**28.** You want to determine the typical dietary habits of students at a college. Which of the following would make the best sample, and why? Also explain why each of the other choices would not make a good sample for this study.

1. Students in a single dormitory
2. Students majoring in public health
3. Students who participate in intercollegiate sports
4. Students enrolled in a required mathematics class

**Solution:**

The math class would be the most representative sample, there being no obvious connection between taking a math class and one's dietary habits! The students in a single dorm would not be a representative sample, as the eating habits of these students could be quite different from those who live off campus. The public health majors or sports participants would not be representative either, as their health awareness and high energy activities, respectively, are likely to result in non-average dietary habits.

□

Identify the sample method in the following and briefly explain why you think it was chosen:

**30.** People magazine chooses its "best-dressed celebrities" by looking at responses from readers who choose to mail in a survey printed in the magazine.

**Solution:**

This is an example of a convenience sampling. People magazine opted for an easy and inexpensive method of sampling which did not require hiring any experts from a polling firm.

□

**31.** A study of sleep habits uses 50 participants whose ages are between 20 and 29, 50 participants whose ages are between 30 and 39, and 50 participants whose ages are between 40 and 49.

**Solution:**

This is an example of stratified sampling. People in different age groups were selected so that the survey would not just sample the young or old.

□

In the following, state whether the study is an observational study or an experiment. If it is an experiment, describe the treatment and control groups.

**36.** A National Cancer Institute study of 716 melanoma patients and 1014 cancer-free patients matched by age, sex, and race found that those having a single large mole had twice the risk of melanoma. Having 10 or more moles was associated with a 12 times greater risk of melanoma.

**Solution:**

This is an observational study.

□

**37.** A Gallup survey done for CNN/USA Today found that 80% of Americans think we are less civil than we were ten years ago and 67% think that we are more likely to use vulgar language than we were ten years ago.

**Solution:**

This is an observational study.

□

**44.** For the following, what type of statistical study is most likely to lead to an answer and why?

Does playing soccer help swimmers improve their times?

**Solution:**

Responses may slightly vary for this question:

An experimental study would be best: have some swimmers play soccer on a regular basis and a control group who does not.

□

Find the confidence interval in each case, and answer any additional questions asked.

**48.** A poll is conducted the day before an election for a U.S. Representative. There are only two candidates running. The poll shows that 48.5% of the voters surveyed favor the Democratic candidate, with a margin of error of 2.0 percentage points. Based on this poll, should the Democratic candidate expect to lose the election? Why or why not?

**Solution:**

The confidence interval for the percentage of voters in favor of the Democratic candidate is obtained by subtracting and adding the margin of error, namely 2%, from the sample statistic which is 48.5%. This yields: 46.5% to 50.5%. Since this includes 50%, it is not clear that the Democratic candidate will lose the election.

□

**49.** The U.S. Labor Department reports that the January unemployment rate was 4.2% and the February unemployment rate was 4.3%. The margin of error for each report is 0.2 percentage point. Can we conclude that unemployment increased from January to February?

**Solution:**

The confidence interval for the January unemployment rate is obtained by subtracting and adding the margin of error of 0.2% from 4.2%, which yields 4% and 4.4%. The confidence interval for this February unemployment rate is obtained by subtracting and adding the margin or error of 0.2% from 4.3%, which yields 4.1% to 4.5%. Since these confidence intervals overlap a great deal, we cannot conclude that unemployment rates increased as claimed.

□

For the following: consider an experiment designed to determine the effectiveness of a new drug. The drug is given to participants in the treatment group, while participants in the control group receive a placebo. For the following sets or results, discuss whether there appears to be evidence that the treatment is effective.

**52.** 40% of those in the treatment group showed improvement and 40% of those in the placebo group showed improvement.

**Solution:**

The proportion of people showing improvement in the treatment group was the same as in the control group; therefore, there is no evidence that the treatment is effective.

□

**53.** 90% of those in the treatment group showed improvement and 50% of those in the placebo group showed improvement.

**Solution:**

The proportion of people showing improvement in the treatment group was almost twice as high as in the control group: there is evidence that the treatment is effective.

□