

Open book and notes. If you need more space use the back of the page or a separate sheet of paper. You should have 5 questions on 4 pages, make sure you have them all.

1. (5 points each) Answer each of the following questions:
 - a. Suppose A and B are two events each with probability greater than 0. Under what circumstances does $P(A|B) = P(A)$? If it is impossible, state that.

 - b. Suppose A and B are two events each with probability greater than 0. Under what circumstances does $P(A|B) = 0$? If it is impossible, state that.

 - c. An ABC news poll asked visitors to its website to respond to a question about the economy and there were 17,251 responses. Explain why the results of this poll should not be generalized to the American population.

 - d. Is it possible for a statistically significant relationship between two variables to have little practical significance? Explain.

 - e. Suppose a relationship between two variables exists in a population and is of practical importance. Is it possible that in a sample from the population the two variables will not have a statistically significant relationship? Explain.

2. (2 pts each) In each case, is the given percent a statistic or a parameter? Circle your answer.
- a. Of 10 students sampled from a high school, 8 (80%) said they would like the school library to have longer hours.

Statistic Parameter

- b. 75% of all students at UCD are in favor of having more bicycle cops on campus.

Statistic Parameter

- c. A customs inspector sampled 5 passengers from among those landing on a large flight from Europe to the United States. He found that one of the five (20%) had an illegal food item.

Statistic Parameter

- d. Based on the 2000 Census, 39.5% of the California population over 5 years old speaks languages other than English at home.

Statistic Parameter

- e. In a national poll it was found that 46% of respondents favored raising the minimum wage.

Statistic Parameter

3. (2 pts each) In each case, specify whether the statement applies to a statistic, a parameter or both. Circle your answer.

- a. It has a sampling distribution.

Statistic Parameter Both

- b. It doesn't change from one sample to the next from the same population.

Statistic Parameter Both

- c. Examples of notation used for it are \bar{x} and \hat{p} .

Statistic Parameter Both

- d. It is a random variable.

Statistic Parameter Both

- e. The mean of the sampling distribution for a sample proportion is an example of one of these.

Statistic Parameter Both

4. (5 pts each) In order to qualify for the Boston Marathon, a woman in the 18-34 year old age group must run an official qualifying marathon in 3 hours and 40 minutes (220 minutes) or less. Samantha is 25 years old. Suppose the times at which she can run a marathon are normally distributed with mean of 230 minutes and standard deviation of 8 minutes.
- Draw a picture of the population of marathon times for Samantha. Show the appropriate ranges into which 68%, 95% and 99.7% of her times would fall.
 - If Samantha runs one marathon, what is the probability that her time will qualify her for the Boston marathon? Show your work.
 - Samantha plans to run 4 marathons in the next year. Suppose her finishing times are independent from one marathon to the next. What is the probability that she has at least one time that qualifies her for the Boston Marathon? Show your work. (Note: You will need to use your answer from part b. If you couldn't solve part b, call the result you would have found p and use it here, showing the formula you would use.)
 - Refer to part c. Describe the sampling distribution for the mean of her four times. Be sure to include the shape, mean and standard deviation.
 - If the Boston Marathon were to change its rules so that people could qualify using the *mean* time from four races, would Samantha's probability of qualifying increase or decrease from what it is based on one race (from part b)? Assume the mean would still need to be 220 minutes or less. Show your work.

5. A survey done in early February asked a random sample of 1200 adults whether or not they had made a New Year's resolution on January 1st. Of the 1200 asked, 756 said they had.
- a. (10 pts) Find a 95% confidence interval for the proportion of all adults who made a New Year's resolution that year. Show your work.
- b. (20 pts) The 756 respondents who said they had made a resolution were then asked whether or not they were still keeping it, now that it was a month later. Of the 756 in this sample, 401 said they were still keeping it. Is this sufficient evidence to conclude that a majority (more than 50%) of those who made a New Year's resolution were still keeping it in early February? Use $\alpha = 0.05$. Show your work.