

BA 240 Practice Exam 2 - Statistics

Name: _____

**FOR FULL POINTS SHOW ALL FORMULAE AND CALCULATIONS.
UNLESS OTHERWISE NOTED, CALCULATE TO 3 DECIMAL PLACES.**

1. In a destructive test of product quality, a briefcase manufacturer measures how much weight it takes to crush the briefcase. 45 cases were randomly sampled and the confidence interval at 99% was from 335.74 to 352.26.

Calculate the mean and standard deviation. (5 points)

Mean _____ Standard deviation _____

What is the sampling error or margin of error at 95%? (3 points)

Sampling error at 95% _____

The company advertises that it takes an average of 350 pounds to crush the briefcase. Based on this sample can it stand by this claim? (2 points)

The company wants to be the margin of error to be within 5 pounds at 95% confidence interval. What specific action should it take and include all calculations. (3 points)

Is this more accurate than the interval presented above? Explain why or why not. (1 point)

2. The Puget Sound area is cited as the worst for traffic congestion. Local authorities question this conclusion. The Puget Sound Transit Authority did a study of commuting patterns in King County. They randomly sampled people on their one-way commuting time to work and found the following (in minutes):

21.7 26.8 33.1 27.9 23.5

39 28 24.7 28.4 28.9

30 33.6 33.3 34.1 35.1

Calculate the mean and the standard deviation (3 points)

Mean _____

Standard Deviation _____

Calculate the 90% confidence interval for the mean commuting time. Assume the underlying population is normal. (5 points)

Interpret the results. (2 points)

What is the margin of error (sampling error) at 99%? (3 points)

If the average commuting time for people in equivalent cities is 27 minutes. Would you say that King County is better or worse? (2 points)

The King County Council requested more accuracy on the survey. They want a margin of error of 1.5 minutes with the same confidence level. What specific changes would you make to the sampling process (show all calculations). (3 points)

3. Obama is running for the Democratic nomination for President of the United States. His campaign is trying to determine he will get the majority (51%) of the popular vote (vote of the people). The latest poll of 1142 people shows that 600 would vote for Obama.
 - a) Draw the distribution of sample proportions showing up to plus and minus three standard errors (3):
 - b) Determine the 80% confidence interval. (3 points)
 - c) At the 95% confidence interval, what is the margin of error? (2)
 - d) Interpret the results so that it can be published in the newspapers and read by the general public. (2 points)
 - e) According to this poll, would Obama win 51% of the vote? Explain why or why not. (4)
 - f) If the pollsters want to increase accuracy so that they would be more confident whether or not Obama would win 51% of the vote. Assuming the proportion remains the same and at the 95% confidence level, what sample size would be required to increase the accuracy of the estimate? Show calculations and explain your reasoning. (4)

4. Some people are concerned that the new tougher standards and high stakes tests adopted by many states may drive up the high school drop-out rate. Washington state reports a high school completion rate of 67%. One school district, whose rates have always been very close to the state average, reports that 167 of their 267 students completed high school. Does this sample show that the completion rate may be decreasing?

- a) What is the null hypothesis (1)
- b) What is the alternative hypothesis (1)
- c) Explain the cost of Type I and Type II error in this situation.(2)
- d) Sketch the curve and show the regions of acceptance and rejection (4)
- e) What is your decision rule? (1)
- f) Compute your test statistic (3)
- g) What is your conclusion? Explain your conclusion in simple nontechnical terms. (2)
- h) Find the p-value. (3)

At what level of alpha would you change your conclusions? _____ (2)

- i) Parents have launched complaints and protest against the school district claiming that rates have dropped due to standardized testing. Federal authorities are claiming that the data doesn't support this. Which side does the data support and why? (2 points)

5. For the past few years, the number of customers of a drive-up OceanFirst bank averaged 20 per hour. This year another bank opened a drive-up window less than one mile away. The manager of OceanFirst believes that his customers have decreased. The number of customers arriving in randomly chosen hours is listed below.

17	23	22	15	18
16	21	21	15	19
20	17	15	22	16

Can we conclude at the 5% significance level that the manager is right?

- a) What is the null hypothesis (1)
- b) What is the alternative hypothesis (1)

- c) Sketch the curve and show the regions of acceptance and rejection (4)
 - d) What is your decision rule? (1)
 - e) Compute your test statistic (3)
 - f) What is your conclusion? Explain your conclusion in simple nontechnical terms. (2)
 - g) Calculate the p-value (3).
6. A sample of 142 of people over 60 showed a mean memory score of 5 and a standard deviation of 2. The general population has a score of 4.7. At the .05 significance level, is there any difference between the people over 60 and the general population?
- a) What is the null hypothesis (1)
 - b) What is the alternative hypothesis (1)
 - c) Sketch the curve and show the regions of acceptance and rejection (4)
 - d) What is your decision rule? (1)
 - e) Compute your test statistic (3)
 - f) What is your conclusion? Explain your conclusion in simple nontechnical terms. (2)
 - g) Calculate the p-value (2).