

Probability and Statistics in Engineering, Fall 2016

Exercise #7

- The amount of time that a drive-through bank teller spends on a customer is a random variable with a mean $\mu = 3.2$ minutes and a standard deviation $\sigma = 1.6$ minutes. If a random sample of 64 customers is observed, find the probability that their mean time at the teller's counter is
 - at most 2.7 minutes;
 - more than 3.5 minutes;
 - at least 3.2 minutes but less than 3.4 minutes.
- The mean score for freshmen on an aptitude test at a certain college is 540, with a standard deviation of 50. What is the probability that two groups of students selected at random, consisting of 32 and 50 students, respectively, will differ in their mean scores by
 - more than 20 points?
 - an amount between 5 and 10 points?Assume the means to be measured to any degree of accuracy.
- The scores on a placement test given to college freshmen for the past five years are approximately normally distributed with a mean $\mu = 71$ and a variance $\sigma^2 = 8$. Would you still consider $\sigma^2 = 8$ to be a valid variance, if a random sample of 20 students who take this placement test this year obtain a value of $s^2 = 8$? Why?
- Consider the following measurements of the heat producing capacity of the coal produced by two mines (in millions of calories per ton):
Mine 1: 8260 8130 8350 8070 8340
Mine 2: 7950 7890 7900 8140 7920 7840
Can it be concluded that the two population variances are equal? Why?
- A taxi company tests a random sample of 10 steel-belted radial tires of a certain brand and recorded the following tread wear results:
48000, 53000, 45000, 61000, 59000, 56000, 63000, 49000, 53000, and 54000 kilometers.
If the population from which the sample was taken has population mean $\mu = 53000$ kilometers, does the sample information support that claim? Why?