

Elementary Statistics for Business

Test 3

Fall 2003

Name:.....

1 Assume that the population of human body temperatures has a mean of $98.6^{\circ} F$ and a standard deviation of $0.48^{\circ} F$. Suppose a random sample of 35 body temperatures were selected. Let X be the body temperature.

(a) What is the mean of the sampling distribution?

(b) What is the standard error of the mean?

(c) Find $P(\bar{X} < 98.8^{\circ} F)$

2 A candy distributor wishes to determine the average water content of bottles of maple syrup from a particular supplier. The bottles contain 8 ounces of liquid, and she decides to determine the water content of 25 of these bottles, using the sample mean as an estimate of the true population mean. What can she say, with probability 95%, about the maximum error if the standard deviation is known to be 0.2 ounces?

- 3 Among 100 randomly selected voters in a certain town, 40 were opposed to floating a bond issue to build a new school building. If we use the sample proportion to estimate the corresponding true proportion, what can we assert with 99% confidence about maximum error?
- 4 The quality control manager of a lightbulb factory needs to estimate the mean life of a large shipment of lightbulbs. The process standard deviation is known to be 100 hours. A random sample of 64 lightbulbs indicated a sample mean life of 350 hours. Construct a 95% confidence interval for the mean life of lightbulbs of this shipment.
- 5 In an air pollution study, an experimental station obtained a mean of 2.36 micrograms of suspended benzene-soluble organic matter per cubic meter with a standard deviation of 0.32 from a random sample of size 18. What can be asserted with 98% confidence about the maximum error if $\bar{x} = 2.36$ micrograms is used as an estimate of the mean of the population samples?

- 6 A market manager for a company that supplies home heating oil wants to estimate the mean annual usage (in gallons) by single-family homes in a particular area. A random sample of 29 single-family homes showed that sample mean is 11122.75 gallons with a standard deviation of 295.72 gallons. Construct a 95% confidence interval for the population mean amount of heating oil consumed by single-family homes per year.

- 7 A survey of 540 female executives conducted by Louis Harris and Associates showed that 189 of the women of the executives surveyed rated their own company as an excellent place for women executives to work. Develop a 95% confidence interval of the proportion of all female executives who rate their own company as an excellent place for women to work.

- 8 How large a sample should be taken to be 95% confident that the sampling error for the estimation of a population proportion is 0.03 or less? Assume that past data are not available for developing a planning value for p .

- 9 A gasoline service station shows a standard deviation of \$6.25 for the charges made by credit-card customers. Assume that the station's manager want to estimate the population mean gasoline bill for credit-card customers to within $\pm \$1.00$. For a 95% confidence level, how large a sample would be necessary?
- 10 (a) How many different samples of size 3 can be drawn from a finite population of size 6?
- (b) Find the value of $s_{\bar{x}}$ if $s = 25$, $n = 100$, and $N = 1000$.
- (c) Find the value of $s_{\bar{x}}$ if $s = 25$, $n = 100$, and population is infinite.