Elementary Statistics for Life Sciences
Test 3
Fall 2003
Name:…………………………………………………

1 Assume that the population of human body temperatures has a mean of $98.6^0 \ F$ and a standard deviation of $0.48^0 \ F$. 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 $P\left(\overline{X} < 98.8^0 F\right)$

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 A zoologist measured tail length in 86 mice, all in the 1-year age group, of the deermouse Peromyscus. The mean length was 60.43 mm and the standard deviation was 3.06 mm. Consruct a 98% confidence interval for the true tail length of the 1-year age group mice population.

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 geneticist weighted 28 female lambs at birth. The lambs were all born in April, were all the same breed, and were all single birth (no twins). The diet and all other environmental conditions were the same. The data yielded a sample mean of 5.17 kg, with a standard deviation of 0.65 kg. Construct a 95% confidence interval for the true birth weight.

7 BRCA1 is a gene that has been linked to breast cancer. Researchers used DNA analysis to search for BRCA1 mutations in 169 women with family histories of breast cancer. Of the 165 women tested, 33 had BRCA1 mutations. Let p denote the probability that a woman with a family history of breast cancer will have a BRCA1 mutation. Construct a 90% confidence interval for p.

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 $s_{\overline{X}}$ if s =25, n =100, and N =1000.

(c) Find the value of $s_{\overline{X}}$ if s =25, n =100, and population is infinite.