REVIEW

1. Below are measurements of the percent calcium content of 30 animal feeds. These 30 feeds represent a simple random sample from the 336 total animal feeds:

4.20, 1.31, 0.83, 1.24, 4.70, 4.43, 2.08, 2.45, 4.77, 3.46, 1.55, 1.80, 1.81, 1.16, 2.38, 3.44, 2.21, 1.23, 3.46, 2.12, 2.94, 1.39, 1.24, 1.20, 1.86, 0.88, 1.22, 5.16, 4.68, 1.07

(a) Make a stem and leaf plot of the data.

(b) Make a 5-number summary of the data.

(c) Use parts (a) and (b) to describe in words the qualitative shape of the sample distribution.

(d) Estimate the average of the calcium content of the 336 feeds. Find a 90% confidence interval for the population average. What assumptions did you make in constructing the confidence interval?

2.A simple random sample of 400 of the 40,000 registered voters of Bville found that 40 of the voters sampled were in favor of Proposition A and 360 were opposed.

(a) Find a 99% confidence interval for the proportion of Bville voters in favor of the proposition.

(b) Are the finite population correction factor, and the unbiased estimate of the SD needed in your calculations?

(c) How would the accuracy of your estimate change if 195 of those sampled were in favor of the proposition? (Answer in both absolute terms and in terms relative to the estimated proportion).

3. The pareto distribution is used in economics as a model for a distribution with a slowly decaying tail.

$$f(x) = \theta c^\theta x^{-(\theta+1)} \qquad x \geq c$$

(a) Assume $c > 0$ is given. Find the method of moments estimate of θ.

(b) Find the maximum likelihood estimate of θ based on 3 observations: $x_1 = 20$, $x_2 = 57$, $x_3 = 17$. Assume $c = 10$.

4. The following are data on cross-breeding peas. Four types of peas result.

Type of pea	Count	Probability
Starchy-green	1997	$\frac{1}{4}(\theta + 2)$
Starchy-white	906	$\frac{1}{4}(1 - \theta)$
Sugary-green	904	$\frac{1}{4}(1 - \theta)$
Sugary-white	32	$\frac{1}{4}(\theta)$

(a) Estimate θ by maximum likelihood.

(b) How well does the probability model fit the data?

(c) Suppose n_1 starchy-green, n_2 starchy-white, ..., and n_4 sugary-white peas result from the experiment. Consider the following estimator of θ:

$$1 - \frac{4(n_2 + n_3)}{n}$$

Calculate its mean square error.