ENGG 319 (Fall 2016) Lecture/Tutorial (Chapter 8)

1. For an F-distribution, find (a) $f_{0.05}$ with v1 = 7 and v2 = 15; (b) $f_{0.05}$ with v1 = 15 and v2 = 7: (c) $f_{0.01}$ with v1 = 24 and v2 = 19;

2. (a) Find $t_{0.025}$ when v = 14. (b) Find $-t_{0.10}$ when v = 10. (c) Find $P(-t_{0.005} < T < t_{0.01})$ for v = 20.

3. For a chi-squared distribution, find (a) $\chi^2_{0.005}$ when v = 5; (b) $\chi^2_{0.05}$ when v = 19;

4. The tar contents of 8 brands of cigarettes selected at random from the latest list released by the Federal Trade Commission are as follows: 7.3, 8.6, 10.4, 16.1, 12.2, 15.1, 14.5, and 9.3 milligrams. Calculate (a) the mean; (b) the variance.

5. If all possible samples of size 16 are drawn from a normal population with mean equal to 50 and standard deviation equal to 5, what is the probability that a sample mean $\bar{X}$ will fall in the interval from $\mu_{\bar{X}} - 1.9\sigma_{\bar{X}}$ to $\mu_{\bar{X}} - 0.4\sigma_{\bar{X}}$? Assume that the sample means can be measured to any degree of accuracy.

6. If the standard deviation of the mean for the sampling distribution of random samples of size 36 from a large or infinite population is 2, how large must the sample size become if the standard deviation is to be reduced to 1.2?

7. A random sample of size 25 is taken from a normal population having a mean of 80 and a standard deviation of 5. A second random sample of size 36 is taken from a different normal population having a mean of 75 and a standard deviation of 3. Find the probability that the sample mean computed from the 25 measurements will exceed the sample mean computed from the 36 measurements by at least 3.4 but less than 5.9.

8. A chemical engineer has the following results for the active ingredient yields from 16 pilot batches processed under a retorting procedure:

Grams/liter	31	33	30.5	32	31.8	32.4	31.2
Frequency	1	3	2	1	4	2	3

Determine the approximate probability that the sample mean is greater than 31 if the true mean yield from the population is 30.5 grams/liter.

9. A manufacturing firm claims that the batteries used in their electronic games will last an average of 30 hours. To maintain this average, 16 batteries are tested each month. If the computed t-value falls between $-t_{0.025}$ and $t_{0.025}$, the firm is satisfied with its claim. What conclusion should the firm draw from a sample that has a mean of $\bar{X} = 27.5$ hours and a standard deviation of s = 5 hours? Assume the distribution of battery lives to be approximately normal.

10. Trace metals in drinking water affect the flavor and an unusually high concentration can pose a health hazard. 13 pairs of data were taken measuring zinc concentration in bottom water and surface water: (Assume the distribution of concentration to be approximately normal and bottom and surface have the same distribution.)

Zinc concentration	1	2	3	4	5	6	7	8	9	10	11	12	13
Bottom	.430	.266	.567	.531	.707	.716	.651	.589	.469	.723	.710	.550	.490
Surface	.415	.238	.390	.410	.605	.609	.632	.523	.411	.612	.620	.300	.659

It is claimed that the variance of zinc concentration in bottom water is less than three times the variance of zinc concentration in surface water. If the claimed statement occurs more than 80% of the time, it is confirmed. What is your conclusion about this claim?