Chapter 8 –Sampling distributions
Part 2

1. For an F-distribution, find (a) $f_{0.05}$ with v1 = 7 and v2 = 15; (b) $f_{0.95}$ with v1 = 15 and v2 = 7: (c) $f_{0.01}$ with v1 = 24 and v2 = 19.
   [Ans: (a) 2.71, (b) = 0.369 (c) 2.92]

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.
   [Ans: (a) 2.145, (b) = -1.372 (c) 0.985]

3. For a chi-squared distribution, find (a) $\chi^2_{0.005}$ when v = 5; (b) $\chi^2_{0.05}$ when v = 19;
   [Ans: (a) 16.75, (b) = 30.144]

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.
   [Ans: (a) 11.69 mg, (b) 10.77 mg]

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.
   [Ans: 0.316]

6. If the standard deviation of the mean for the sampling distribution of random samples of size 36 from a population is 2, how large must the sample size become if the standard deviation is to be reduced to 1.2?
   [Ans: At least 100.]

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.
   [Ans: 0.7117]

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 normal population is 30.5 grams/liter. [Ans: 0.014]

9. A manufacturing firm claims that the batteries used in their electronic games will last an average of 30 hours. 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 of 16 batteries 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 Pull-strength tests on 10 soldered leads for a semiconductor device yield the following results, in pounds of force required to rupture the bond: 19.8, 12.7, 13.2, 16.9, 10.6, 18.8, 11.1, 14.3, 17.0, 12.5. Another set of 8 leads was tested after encapsulation to determine whether the pull strength had been increased by encapsulation of the device, with the following results: 24.9, 22.8, 23.6, 22.1, 20.4, 21.6, 21.8, 22.5.

11. Two random samples of size 25 and 31, respectively, are drawn from normal populations with variances 10 and 15, respectively. What is the probability that the ratio of the variances of the two samples is greater that 1.26? [Ans: 0.05]