Some Formulas for Ch 7:

Case 1: CI for pop. mean when pop. distribution is Normal and pop SD is known

$\bar{x} \pm z_{(\alpha/2)}^* \sigma/\sqrt{n}$ where $\bar{x}$ is the sample mean

Case 2: CI for pop. mean when pop. distribution is Normal and pop SD is unknown

$\bar{x} \pm t_{(\alpha/2,n-1)}^* \hat{\sigma}/\sqrt{n}$ where $\hat{\sigma}$ is the sample SD (i.e. s)

Case 3: CI for pop. mean when pop distribution is not Normal

$\bar{x} \pm z_{(\alpha/2)}^* \hat{\sigma}/\sqrt{n}$)

Case 4: CI for pop. proportion

$\hat{p} \pm z_{(\alpha/2)}^* \sqrt{\hat{p}(1-\hat{p})/n}$ where $\hat{p}$ is the sample proportion

Case 5: CI for population SD when pop. distribution is Normal.

lower limit is (n-1) $\hat{\sigma}^2/\chi^2_{\alpha/2.n-1}$ and upper limit is (n-1) $\hat{\sigma}^2/\chi^2_{1-\alpha/2.n-1}$

Case 6: CI for other parameters

See pp 288-290

Sample Size Calculations:

Equate the half-width of the CI to the maximum acceptable error of estimate.

e.g. for Case 1, if E is the maximum acceptable error, solve $E= z_{(\alpha/2)}^* \sigma/\sqrt{n}$ for n.

Notes: 1. The sample size need not be large. This case 1 is rare unless we have past experience with populations of this sort that enable SD to be reasonably guessed.
2. The sample size need not be large. This Case 2 is fairly common since normal populations are fairly common. The formula makes allowance for the variability in the estimate of the population SD.
3.4. For Cases 3 and 4, we need a large enough sample that the CLT approximation is good enough. This is usually about $n \geq 30$ for Case 3, but larger for Case 4. In practice, the sample size requirement depends on the importance of accurate probability calculations. Note the formula for Case 3 is the same as for Case 1 – the difference is that it is only approximate since the Normality of the sample mean depends on CLT approx.
5. CI for pop. SD when pop. distribution is not Normal are beyond the scope of this course.

6. The CI for other parameters is discussed on pp 288-290 and an example is worked in a simple case. However, in this course we will not explore this approach further than the short discussion in the text.

7. In the sample size caclulation, n must be an integer, so round up.

Assignment # 7 (Due Monday March 19, 2007, by 1:00 pm)

1. p 290 #4
2. p 291 #10
3. p 298 # 20
4. p 307 #36a,b
5. p 311 #46
6. p 313 #58

There are 2 marks per question and the total will be recorded out of 10.