

2. For a random sample of 16 students, the sample mean time to complete a particular STAT 400 homework assignment was 162 minutes with sample standard deviation of 20 minutes. Assume that the time to complete this assignment is normally distributed.

- a) Construct a 95% (two-sided) confidence interval for the overall average time to complete this assignment.
- b) A certain STAT 400 instructor claims that the overall average time to complete this assignment is at most 150 minutes. Perform the appropriate test at a 5% significance level. State the null and alternative hypotheses for this test in terms of the relevant parameter, report the value of the test statistic, the critical value(s), and state your decision.
- c) Using the  $t$  distribution table only, what is the p-value of the test in part (b)?  
( You may give a range. )
- d) Use a computer to find the p-value of the test in part (b).

“Hint”: EXCEL       $=TDIST( t, \text{degrees of freedom}, 1 )$   
                           gives area to the right of  $t$  ( $t \geq 0$ ).  
                            $=TDIST( t, \text{degrees of freedom}, 2 )$   
                           gives  $2 \times$  ( area to the right of  $t$  ).

OR                    R       $> pt( t, \text{degrees of freedom} )$   
                           gives area to the left of  $t$ .

- e) Construct a 90% (two-sided) confidence interval for the overall standard deviation of the time needed to complete this assignment.
- f) Test  $H_0: \sigma \leq 17$  minutes vs.  $H_1: \sigma > 17$  minutes at a 10% significance level.  
Report the value of the test statistic, the critical value(s), and state your decision.
- g) Using the chi-square distribution table only, what is the p-value of the test in part (f)?  
( You may give a range. )
- h) Use a computer to find the p-value of the test in part (f).

“Hint”: EXCEL       $=CHIDIST( x, \text{degrees of freedom} )$   
                           gives area to the right of  $x$ .

OR                    R       $> pchisq( x, \text{degrees of freedom} )$   
                           gives area to the left of  $x$ .