PROBABILITY AND STATISTICS, CLASS EXERCISE 14

(1) A sample of five "8-hour" workdays in a bank had actual lengths (in minutes) of 468, 449, 494, 496, 479. Compute the sample variance and construct a 95% confidence interval for the population standard deviation σ, assuming that the workday lengths are normaly distributed.

(2) A study of the diameter at breast height of Acer Saccharinum gave sample variance $s^2 = 50.4\ cm^2$ based on a sample of 22 observations. Assuming that the sample comes from a normal population, test $H_0 : \sigma = 6\ cm$ versus $H_1 : \sigma > 6\ cm$ at the 5% level of significance.

(3) Two independent sampling stations are chosen for a study, one located downstream from an acid mine discharge point and the other located upstream. For 12 samples collected at the upstream station the species diversity index has mean value $\bar{x}_1 = 3.11$ and st. dev. $s_1 = 0.771$, while 10 samples collected at the downstream station had $\bar{x}_2 = 2.04$ and $s_2 = 0.448$. Test $H_0 : \mu_1 = \mu_2$ versus $H_1 : \mu_1 > \mu_2$ at the 5% level of significance assuming that the populations are normally distributed with equal variances. Make sure to draw a conclusion in the context of the problem.

(4) The deterioration of many municipal pipeline networks across the country is a growing concern. The following data on the tensile strength (psi) of pipelines both when a certain fusion process was used and when this process was not used.

No fusion	2748	2700	2655	2822	2511	3149	3257	3213	3220	2753
Fused	3027	3356	3359	3297	3125	2910	2889	2902		

Assuming that the two poluations are normally distributed test the hypothesis that there fusion does not affect the tensile strength at the $\alpha = 0.05$ level of significance.