Math/STAT 319 Homework 6 Due Mar. 1 (two pages)

1. Ex 8.38 A study of the ability of individuals to walk in a straight line (" Can We Really Walk Straight? " Amer. J. Phys. Anthropol., 1992: 1927) reported the accompanying data on cadence (strides per second) for a sample of n 20 randomly selected healthy men.

   .95 .85 .92 .95 .93 .86 1.00 .92 .85 .81 .78 .93 .93 1.05 .93 1.06 1.06 .96 .81 .96

   A normal probability plot gives substantial support to the assumption that the population distribution of cadence is approximately normal. A descriptive summary of the data from MINITAB follows:

Variable	N	Mean	Median	TrMean	StDev	SEMean
Cadence	20	0.9255	0.9300	0.9261	0.0809	0.0181

Variable	Min	Max	Q1	Q3
Cadence	0.7800	1.0600	0.8525	0.9600

   Note that "StDev" gives s, and " SEMean" gives $s/\sqrt{n}$.

   Given that $t_{0.025,19} = 2.093, t_{0.05,19} = 1.729, t_{0.025,20} = .086, t_{0.05,19} = 1.725$

   (a) Calculate and interpret a 95% confidence interval for population mean cadence.

2. Ex 9.2 For the following pairs of assertions, indicate whether they comply with the rules of setting up the hypothesis. Please also specify why or why not.

   - $H_0 : \mu = 100$ vs $H_1 : \mu > 100$
   - $H_0 : \sigma = 20$ vs $H_1 : \sigma \leq 20$
   - $H_0 : p \neq 0.25$ vs $H_1 : p = 0.25$
   - $H_0 : \mu_1 - \mu_2 = 25$ vs $H_1 : \mu_1 - \mu_2 > 100$
   - $H_0 : S_1^2 = S_2^2$ vs $H_1 : S_1^2 \neq S_2^2$
   - $H_0 : \mu = 120$ vs $H_1 : \mu = 150$
   - $H_0 : \sigma_1/\sigma_2 = 1$ vs $H_1 : \sigma_1/\sigma_2 \neq 1$
   - $H_0 : p_1 - p_2 = -0.1$ vs $H_1 : p_1 - p_2 < -0.1$

3. Ex 9.3 To determine whether the girder welds in a new performing arts center meet specifications, a random sample of welds is selected, and tests are conducted on each weld in the sample. Weld strength is measured as the force required to break the weld. Suppose the specifications state that mean strength of welds should exceed 100 lb/in^2; the inspection team decides to test $H_0 : \mu = 100$ versus $H_a : \mu > 100$. Explain why it might be preferable to use this H_a rather than $\mu < 100$.

4. Ex 9.6 Many older homes have electrical systems that use fuses rather than circuit breakers. A manufacturer of 40-amp fuses wants to make sure that the mean amperage at which its fuses burn out is in fact 40. If the mean amperage is lower than 40, customers will complain because the fuses require replacement too often. If the mean amperage is higher than 40, the manufacturer might be liable for damage to an electrical system due to fuse malfunction. To verify the amperage of the fuses, a sample of fuses is to be selected and inspected. If a hypothesis test were to be performed on the resulting data, what null and alternative hypotheses would be of interest to the manufacturer? Describe type I and type II errors in the context of this problem situation.