Math/STAT 319 Homework 7 Due Mar. 15 (one pages)

1. Ex 9.12 A new design for the braking system on a certain type of car has been proposed. For the current system, the true average braking distance at 40 mph under specified conditions is known to be 120 ft. It is proposed that the new design be implemented only if sample data strongly indicates a reduction in true average braking distance for the new design.

   (a) Define the parameter of interest and state the relevant hypotheses.

   (b) Suppose braking distance for the new system is normally distributed with $\sigma = 10$. Let $\bar{X}$ denote the sample average braking distance for a random sample for 36 observations. Which of the following rejection regions is appropriate: $R_1 = \{\bar{x} : \bar{x} \geq 124.80\}$, $R_2 = \{\bar{x} : \bar{x} \leq 115.20\}$ and $R_3 = \{\bar{x} : \bar{x} \geq 125.13 \text{ or } \bar{x} \leq 114.87\}$?

   (c) What is the significance level for the appropriate region of part(b) ?

   (d) What is the probability that the new design is not implemented when its true average braking distance is actually 115 ft and the appropriate reject region in part (b) is used.

   (e) Let $Z = (\bar{X} - 120)/(\sigma/\sqrt{n})$. What is the significance level for the rejection region $\{z : z \leq -2.33\}$?

2. Ex 9.31 In an experiment designed to measure the time necessary for an inspector's eyes to become used to the reduced amount of light necessary for penetrant inspection, the sample average time for $n = 9$ inspectors was 6.32 s and the sample standard deviation was 1.65 s. It has previously been assumed that the average adaptation time was at least 7 s. Assuming adaptation time to be normally distributed, do the data contradict prior belief? Use the t test with $\alpha = 0.1$.

   (hints: follow the five-steps in testing procedure and use the t test.)