**STATISTICS FOR ENGINEERS**
**ASSIGNMENT IX**
**OCTOBER 29, 2010**

This homework assignment deals with problems from all previous chapters. Please make sure you read the questions thoroughly and think about them before you begin your answer. There are five problems, each worth two points. Make sure you show all your work *and* state your assumptions clearly.

## Problem 9.1

You are in charge of quality control at a barbed wire manufacturing plant. Your plant receives steel wire from the Lindsey Corporation. One week, a sample of 125 lengths of wire had mean breaking strength 6.1 N, with a standard deviation of 0.7N. You do not like these numbers, so you decide to go with a different wire supplier. The next week, you receive a batch of wire from the Navidi Corporation. In a sample of 75 lengths of wire from the new vendor, the mean breaking strength was 5.8N and the standard deviation was 1.0N. Find a 90% confidence interval for the difference in mean breaking strength between the wires supplied by the two vendors.

## Problem 9.2

A method of doping a silicon wafer with gallium arsenide is supposed to produce a coating whose mean thickness is no greater than 7 microns ($\mu$m). You are told by a line operator that the doping machine is malfunctioning, so you measure the thickness of 36 coated specimens and test the hypothesis $H_0 : \mu \leq 7$ against $H_A : \mu > 7$. From your tests, you obtain a p-value of 0.40. Since $p > 0.05$, you naturally conclude that the mean thickness is within specification. Is this conclusion correct? Explain.

## Problem 9.3

Bakugan Industries asserts that their top-line watches have a greater than 95% probability that its readings are within 0.1s of the true time. You decide to test this claim. In a sample of 500 watches, you find that 470 are within 0.1s of the true time. Is there enough evidence to reject the claim? Explain.

## Problem 9.4

A voltmeter is used to make five measures of the carbon content of a specific steel beam in a bridge on each of two successive days. The results are as follows:

| | | | | | |
|---|---|---|---|---|---|
| Day 1: | 2.1321 | 2.1385 | 2.0985 | 2.0941 | 2.0680 |
| Day 2: | 2.0853 | 2.1476 | 2.0733 | 2.1194 | 2.0717 |

Can you conclude that the calibration of the voltmeter has changed from the first day to the second? Explain.

## Problem 9.5

The crystal thickness of six watch faces was measured to be 9.3, 0.9, 9.0, 21.7, 11.5, and 13.9. For this problem, the measured values definitely do not come from an normal distribution but I am willing to assume symmetry. Test the hypothesis $H_0 : \mu = 20$ against $H_A : \mu \neq 20$.