ISYE 430/530 Homework Set Number 3

4.5. The inside diameters of bearings used in an aircraft [SS] landing gear assembly are known to have a standard deviation of $\sigma = 0.002$ cm. A random sample of 15 bearings has an average inside diameter of 8.2535 cm.

    a. Test the hypothesis that the mean inside bearing diameter is 8.25 cm. Use a two-sided alternative and $\alpha = 0.05$.

Additional part: Find the probability of not detecting a shift if the mean of the process changes from 8.25 cm to 8.255 cm.

4.6. The service life of a battery used in a cardiac pacemaker is assumed to be normally distributed. A random sample of ten batteries is subjected to an accelerated life test by running them continuously at an elevated temperature until failure, and the following lifetimes (in hours) are obtained: 25.5, 26.1, 26.8, 23.2, 24.2, 28.4, 25.0, 27.8, 27.3, and 25.7.

    a. The manufacturer wants to be certain that the mean battery life exceeds 25 h. What conclusions can be drawn from these data (use $\alpha = 0.05$)?

Additional Part: The manufacturer claims that the standard deviation battery life is less than 1.5 hours. What conclusions can be drawn from the above data?

4.12. A random sample of 500 connecting rod pins contains 65 nonconforming units. Estimate the process fraction nonconforming.

    a. Test the hypothesis that the true fraction defective in this process is 0.08. Use $\alpha = 0.05$.