A.P. Statistics
Assignment 8.4

Remember to show your thinking through your work.

1) Gas chromatography is a sensitive technique used by chemists to measure small amounts of compounds. The response of a gas chromatograph is calibrated by repeatedly testing specimens containing a known amount of the compound to be measured. A calibration study for a specimen containing 1 nanogram (ng) (that's 10^{-9} gram) of a compound gave the following response readings:

21.6 20.0 25.0 21.9

The response is known from experience to vary according to a normal distribution unless an outlier indicates an error in the analysis. Estimate the mean response to 1 ng of this substance, and give the margin of error for your choice of confidence level. Then explain to a chemist who knows no statistics what your margin of error means.

2) A random sample of 10 one-bedroom apartments from your local newspaper has these monthly rents (dollars):

500 650 600 505 450 550 515 495 650 395

Do these data give good reason to believe that the mean rent of all advertised apartments is greater than $500 per month? Carry out a complete significance test.

3) How much do users pay for Internet service? Here are the monthly fees (in dollars) paid by a random sample of 50 users of commercial Internet service providers in August 2000:

20	40	22	22	21	21	20	10	20	20
20	13	18	50	20	18	15	8	22	25
22	10	20	22	22	21	15	23	30	12
9	20	40	22	29	19	15	20	20	20
20	15	19	21	14	22	21	35	20	22

(a) Make a plot of the data (this could be a histogram, stemplot, boxplot, or normal probability plot). Be sure to describe what the plot looks like. Are the t procedures justified? Explain.

(b) Give a 95% confidence interval for the mean monthly cost of Internet access in August 2000.

4) An agricultural field trial compares the yield of two varieties of tomatoes for commercial use. The researchers divide in half each of 10 small plots of land in different locations and plant each tomato variety on one half of each plot. After harvest, they compare the yields in pounds per plant at each location. The 10 differences (Variety A − Variety B) give the following statistics: $\bar{x} = 0.46$ and $s = 0.92$. Is there convincing evidence that Variety A has the higher mean yield? Carry out a complete significance test.