Exercise 5A.1

Much discussion has appeared in the medical literature in recent years on the role of diet in the development of heart disease. The serum cholesterol levels of a group of people who eat a primarily macrobiotic diet are measured. Among 10 of them, aged 20-39, the mean cholesterol level was found to be 210 mg/dL. The mean cholesterol level in the general population in this age group is 230 mg/dL. The standard deviation of cholesterol levels is known to be 35 mg/ dL.

(a) Test the hypothesis that people on a macrobiotic diet have cholesterol levels that are not equal to those of the general population.

(b) Suppose instead the hypothesis is that people on a macrobiotic diet have cholesterol levels lower than those of the general population. Perform the appropriate significance test.

Exercise 5A.2

A study was undertaken to measure the amount of vitamin C in corn soy blend (CSB), a low-cost, fortified food that can be incorporated into different food preparations (especially useful in emergency relief programs). Regulations state that there should be 40 mg/100g of vitamin C in CSB. Measurements of vitamin C were taken on eight samples of CSB produced in a factory. The mean vitamin C level was 22.5 mg/100 g with standard deviation 7.19 mg/100 g. Does the mean vitamin C level conform to the regulations?

Exercise 5A.3

To test how accurate home radon detectors are, researchers placed 12 detectors in a chamber that exposed them to 105 picocuries per liter (pCi/l) of radon. They analyzed the detector readings using a t-test. Complete the Stata output below.

```
. ttest radon = 105


One-sample t test
------------------------------------------------------------------------
Variable |   Obs        Mean    Std. Err.   Std. Dev.    [95% Conf. Interval]
---------+--------------------------------------------------------------
   radon |    12     104.1333    _____    9.397422     _____    _____
------------------------------------------------------------------------
    mean = mean(radon)                                        t =   _____
Ho: mean = 105                                  degrees of freedom =      __

   Ha: mean < 105               Ha: mean != 105                 Ha: mean > 105
 Pr(T < t) = 0.3777         Pr(|T| > |t|) = 0.7554          Pr(T > t) = 0.6223
```

Exercise 5A.4

We are interested in knowing if the amount of phosphorous in the soil is equal to 35.0. The mean phosphorous level from 43 independent, randomly selected soil samples is 32.4 and the sample standard deviation is 5.5. What do we conclude?

Exercise 5A.5

We are interested in knowing if the concentration of cadmium in the soil is greater than 1.2. The mean cadmium level from 29 independent, randomly selected soil samples is 1.45 and the sample standard deviation is 0.55. What do we conclude?

Exercise 5A.6

We are interested in knowing if the amount of nitrogen in the soil is less than 8.0. The mean nitrogen level from 28 soil samples is 8.2 and the sample standard deviation is 0.74. What do we conclude?