**Lesson 9.1 – Significance Tests and Decision Making**

1. **Are these potatoes keepers?** A company that makes potato chips requires each shipment of potatoes to meet certain quality standards. If the company finds convincing evidence that more than 8% of the potatoes in the shipment have “blemishes,” the truck will be sent back to the supplier to get another load of potatoes. Otherwise, the entire truckload will be used to make potato chips. The producer will perform a significance test using the hypotheses:

*H*0: *Ha* :

*p* = the true proportion of potatoes with blemishes in a given truckload.

A supervisor selects a random sample of 500 potatoes from the truck and finds that 52 of the potatoes (= 0.104 ) have blemishes. The resulting *P*-value of the test is 0.0240.

1. What conclusion should we make at α = 0.05?
2. Describe a Type I and a Type II error in context.
3. Give a consequence of each type of error in this setting.
4. Which error is more serious for the potato chip producer? Explain.
5. Your company markets a computerized medical diagnostic program. The program scans the results of medical tests and either clears the patient (they can go home) or refers the case to a doctor. The program is used to screen thousands of people who do not have specific medical complaints and it makes a decision about each person.
   1. What are the two hypotheses and the two types of error that the program can make? Try to describe the two types of error in terms of “false positive” and “false negative” test results.
   2. The program can be adjusted to decrease one error probability at the cost of an increase in the other error probability. Which error probability would you choose to make smaller, and why?
6. You are thinking about opening a restaurant and are searching for a good location. From research you have done, you know that the mean income of those living near the restaurant must be over $45,000 to support the type of upscale restaurant you wish to open. You decide to take an SRS of 50 people living near one potential location. Based on the mean income of this sample, you will decide whether to open a restaurant there. A number of similar studies have shown that σ = $5,000.
   1. State the null and alternative hypotheses.
   2. Describe the two types of errors that you might make.

Type I:

Type II:

* 1. Which of the two types of error is most serious? Explain.
  2. If you had to choose one of the “standard” significant levels for your significance test, would you choose α = 0.01, 0.05, or 0.10? Justify your choice.
  3. Based on your choice in part (d), how high will the sample mean need to be before you decide to open a restaurant in that area?