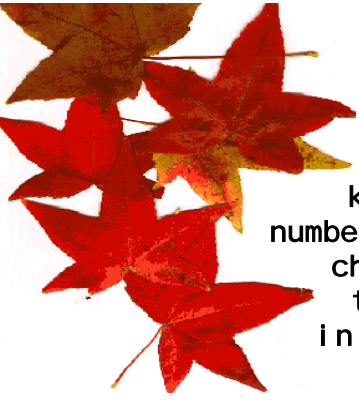




## Lab 2

1. Let  $X$  be a random variable such that  $X \sim N(2.8, 8.2)$ . What is the probability that  $X$  takes a value between 1.0 and 3.0?
  
2. You have been asked to estimate the mean income of your neighborhood to within \$100.00 of the true amount.
  - a. Assuming that incomes in the neighborhood have a standard deviation of \$1,500.00, how large a sample must you select to ensure that your estimate would be wrong in only one out of five samples?
  - b. Repeat 'a' only this time determine how large a sample you must select to ensure that your estimate would be wrong in only one out of twenty samples.
  - c. Repeat 'a' only this time assume that the standard deviation in incomes is \$1,000.00.
  - d. What do 'a' through 'c' demonstrate about the relation between the accuracy of your estimates and the sizes of your variance and sample?
  
3. Prior to taking their first exam in STAT401, 34 people enrolled in the course were sampled and then evaluated according to their "numerophobia levels." (In this problem assume that these people comprise a random sample of all students who have ever taken STAT401.) Values on the numerophobia measure range from 0 = no fear to 100 = extreme fear of numbers. Your data are:  
  
Foreign students: 21, 31, 19, 38, 60, 47, 23, 29, 17, 40, 58, 49, 25, 27, 51, 41  
U.S. students: 62, 20, 28, 37, 24, 50, 28, 39, 60, 22, 26, 39, 22, 52, 30, 37, 59, 13
  - a. Calculate an interval estimate of the mean for the population of all students who have ever taken STAT401. (Use a .10 level of significance.)
  - b. Give an 80% confidence interval for the mean numerophobia score for all STAT401 students.
  - c. Which interval is larger--the one calculated in part a or the one calculated in part b? Explain why the intervals differ as they do.



4. Solve both of the following for  $k$ . (Hints: Assume that  $k$  is a constant. Part b has a solution for  $k$  that is a real number; part a does not. Also, you may wish to (optionally) try checking your solutions again by substituting them back into the original equations. Checking your work gets a bit messy in part a, but is much easier in part b.):

a. 
$$-4 \sum_{i=1}^n \left( -\frac{k}{3X_i} \right)^2 = n - 100$$

b. 
$$\sum_{j=1}^n \sum_{i=1}^n \left( \frac{X_j}{n^2} - k \right) = \bar{X} + 5n^2$$

Lab Assignment