

1. Find the area under the standard normal curve
  - (a) between  $z = 0$  and  $z = 1.2$
  - (b) between  $z = -0.46$  and  $z = 2.21$
  - (c) to the right of  $z = -1.28$
  
2. A credit card company has found that its average balance per customer is  $N(250, 2500)$ .
  - a. Find the probability that a balance is over \$300 [i.e.  $P(X \geq 300)$ ].  
Find  $P(X \leq \$150)$
  - b. Find the value of  $a$  such that the probability of a customer's balance being less than this amount is 0.05.
  - c. Determine values of  $a$  and  $b$  such that  
 $P(a \leq X \leq b) = 0.99$ .
  
3. Find the probability of getting between 3 and 6 heads inclusive in 10 tosses of a fair coin by using
  - (a) the binomial distribution
  - (b) the normal approximation to the binomial distribution
  
4. Find the values of  $t$  for the T distribution which satisfy each of the following conditions:
  - (a) the area between  $-t$  and  $t$  is 0.95 and  $v = 14$
  - (b) the area to the left of  $t$  is .99, and  $v = 7$
  - (c) the combined area to the right of  $t$  and left of  $-t$  is 0.01 and  $v = 5$ .
  
5. Construct the following confidence intervals. First do each calculation by hand. Then confirm your answer using Stata.
  - a. A recent survey asked respondents to rate, on a scale from 0 to 100, how good a job they thought the President of the United States had done during the past 6 months. Assume that the population variance for this survey equals 100. Construct a 95% confidence interval for  $\mu$ , assuming that a random sample of 256 adults yielded a mean score of 61.
  - b. In order to estimate the percent of all housecleaners who use "Wash Away" detergent, 196 housecleaners were randomly selected and interviewed. If 108 of these housecleaners use this product, what would be a 99% confidence interval for the population percent of householders who use "Wash Away?" (NOTE: The approximate confidence interval will work satisfactorily in this case - but you are welcome to compute the Wilson CI if you want. Definitely have Stata compute it.)
  - c. Suppose that you take a survey of the delivery time on a random sample ( $N = 25$ ) of new Boeing 767s from the date of order, and find the sample mean and variance are 420 days and 25 days, respectively. What are the earliest and latest days a company should expect delivery? Use a 99% confidence interval and assume normality.

6. A sociologist hypothesizes that the average income for a population is \$20,000. In fact, the population mean is not \$20,000. The sociologist fails to reject the hypothesis. Has an error been made, and if so, what type of error? If an error has been made, how can one avoid making that error in the future?

7. Work two of the following (all three if you want extra practice):

- a. Senator Fogbound claims that 75% of his constituents favored his voting policies over the last year. In a sample of 50 of these people, only 50% favored his voting policies. Is this enough evidence to make the senator's claim highly suspect? Use the normal approximation to the binomial.
- b. In an experiment of extrasensory perception (E.S.P.) a subject in one room is asked to state the color (red or blue) of a card chosen from a deck of 50 well-shuffled cards by an individual in another room. It is unknown to the subject how many red or blue cards are in the deck. If the subject identifies 32 cards correctly, determine whether the results are significant at the (a) 0.05 and (b) 0.01 level of significance. Use a 1-tailed test.
- c. The manufacturer of a patent medicine claimed that it was 90% effective in relieving an allergy for a period of 8 hours. In a sample of 200 people who had the allergy, the medicine provided relief for 160 people. State whether you feel the manufacturer's claim is legitimate. Be explicit about what level of significance you are using, and whether you are using a 1-tailed or 2-tailed test.

8. Publishers of a new book highly critical of Notre Dame football claim that the work is resulting in lower TV ratings for ND games. TV viewership surveys, taken both before and after the book was published, reveal the following:

	Watched ND last week	Did not watch
Before book published	370	630
After book published	430	570

Should the null hypothesis be rejected, or not? [HINT: No calculations are necessary]