



6. Suppose we want to construct a 95% confidence interval for  $\mu$ . Assuming  $\bar{x}$  and  $\sigma$  do not change, we will get a narrower interval if we can use  $n = 100$  instead of  $n = 50$ .  
TRUE FALSE
7. The hypotheses  $H_o : \bar{x} = 11.1$  versus  $H_1 : \bar{x} < 11.1$  are not valid statistical hypotheses.  
TRUE FALSE
8. In testing  $H_o : \mu_1 - \mu_2 = 0$  vs.  $H_1 : \mu_1 - \mu_2 < 0$ , if the p-value = 0.027, we would reject  $H_o$  when  $\alpha = 0.05$  but not when  $\alpha = 0.02$ .  
TRUE FALSE
9. Suppose 6% of business students love stats. A random sample of 5 business students is selected, and  $x =$  the number that love stats. Then  $x$  is a binomial random variable.  
TRUE FALSE
10. A 6-sided dice is thrown 3 times. The probability of a 4 appearing each time is 0.5.  
TRUE FALSE
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- (4) 1. You have invested in two different mutual funds. The probability that the first mutual fund turns a profit is  $7/10$ . Given that the second mutual fund doesn't make a profit, the probability that the first makes a profit is  $3/5$ . The probability that the first makes a profit and the second does not is  $1/5$ . What is the probability that the second mutual fund turns a profit?

2. One of four prizes will be awarded in a draw, based on the following distribution:

$x$	\$10	\$20	\$100	\$1000
$p(x)$	0.8		0.08	0.001

- (2) (a) What is the probability that the prize value is more than \$5?
- (5) (b) Find the mean value of prize awarded, and the standard deviation.

3. Suppose the savings account balances at a local bank are normally distributed. From historical data, its savings accounts have a mean balance of \$1,000 and a standard deviation of \$240.
- (3) (a) What is the probability that the balance is less than \$1072?
  - (4) (b) What is the 90th percentile of account balances? Recall that the  $p$ th percentile is the point below which  $p\%$  of observations fall.
  - (5) (c) Government auditors have asked to randomly sample 64 of the bank's accounts to assess the reliability of the mean balance reported by the bank. Find the probability that the sample mean balance would be less than \$1,072.
4. The marketing research department of a large manufacturer of facial tissue paper was responsible for determining customer preferences regarding the softness of its newly developed product (brand A). Researchers believe that the proportion of all customers who rank brand A softer exceeds .50. To investigate this, a random sample of 250 customers was selected. Each customer was asked to rank the softness of brand A; 146 ranked brand A softer.
- (10) (a) Does it appear that the researchers are correct? State the appropriate hypotheses, calculate the test statistic and draw your conclusion using  $\alpha = 0.01$ .
  - (4) (b) Calculate the p-value.
  - (3) (c) State the assumptions necessary for the test procedure you used in (a) to be valid.
- (15) 5. An experiment has been conducted at a university to compare the mean number of study hours expended per week by student athletes with the mean number of hours expended by nonathletes. A random sample of 55 athletes produced a mean equal to 20.6 hours studied per week and a standard deviation equal to 5.3 hours. A second random sample of 200 nonathletes produced a mean equal to 23.5 hours per week and a standard deviation equal to 4.1 hours.
- If we believe that the mean number of hours expended by nonathletes is less than that of athletes, state the appropriate hypotheses, calculate the test statistic and draw your conclusion using  $\alpha = 0.05$ .

6. To investigate the relationship between yield of potatoes ( $y$ ), and level of fertilizer application ( $x$ ), an experimenter divides a field into eight plots of equal size and applies differing amounts of fertilizer to each. The yield of potatoes (in pounds) and the fertilizer application (in pounds) are recorded for each plot. The data are as follows:

$x$	1	1.5	2	2.5	3	3.5	4	4.5
$y$	25	31	27	28	36	35	32	34

Summary statistics yield

$$\sum_i x_i = 22, \quad \sum_i x_i^2 = 71, \quad SS_{xx} = 10.5$$

$$\sum_i y_i = 247, \quad \sum_i y_i^2 = 7737, \quad SS_{yy} = 112, \quad \sum_i x_i y_i = 703$$

- (10) (a) Assuming a linear relationship is appropriate, determine the least squares regression line.
- (2) (b) Find the residual for the yield of potatoes if 2.5 pounds of fertilizer are applied.
- (2) (c) Find and interpret the estimate of  $\sigma$ .
- (2) (d) Find the sample correlation coefficient.
7. A major department store chain is interested in estimating the average amount its credit card customers spent on their first visit to the chain's new store in the mall.
- (5) (a) Suppose they select a random sample of 20 credit card customers, and find their average spending is \$63 and the standard deviation is \$7.65. Find a 90% confidence interval for the average spending of all the credit card customers.
- (4) (b) If they are willing to assume the variance of the amount is 400, how many people do they need to survey if they wish to construct a 95% confidence interval that is accurate to within 2 dollars ?