Show work to support your solutions, whenever possible.

1.   For each conjecture (claim), state the null and alternative hypotheses using statistical symbols.

   (a) The average age of community college students is 24.6 years.
            H_0: _____ H_1: _____

   (b) The average age of attorneys is greater than 25.4 years.

   (c) The average score at 50 high school basketball games is less than 88 points.

   (d) The average pulse rate of male marathon runners is less than 70 beats per minute.

   (e) The average weight loss for a group of people who exercise at least 30 minutes per day, at least 3 days per week, for 6 weeks is 8.2 lb.

For #2–5, use the traditional method of hypothesis testing. Assume the population is normally distributed in each case. Use the p-value in your conclusion.

2.   The average undergraduate cost for tuition, fees, room and board for all institutions of higher learning last year was $19,410. A random sample of costs this year for 40 institutions indicated that the sample mean was $22,098. The population standard deviation was $6,050. At the 0.01 level of significance, is there sufficient evidence to conclude that the cost of attendance has increased?

   H_0: _____
   H_1: _____

   Claim:

   Test statistic: Critical value (s):

   Decision:

   Conclusion:

3. The average amount of rainfall during the summer months for the northeastern part of the U.S. is 11.52 inches. A researcher selects a random sample of 10 cities in the northeast and finds that the average amount of rainfall for 2005 was 7.42 inches. The standard deviation for this sample was 1.3 inches. At $\alpha = 0.05$, can it be concluded that for 2005, the mean rainfall was below 11.52 inches?

4. A recent survey found that 64.7% of the population own their own homes. In a random sample of 150 heads of households, 92 responded that they owned their own homes. At the $\alpha = 0.01$ level of significance, does the survey indicate a significant difference from the national population?

5. A random sample of 20 different kinds of doughnuts had the following calorie counts. At $\alpha = 0.01$, is there sufficient evidence to conclude that the standard deviation is greater than 20 calories?

| 290 | 320 | 260 | 220 | 300 | 310 | 310 | 270 | 250 | 230 |
| 270 | 260 | 310 | 200 | 250 | 250 | 270 | 210 | 260 | 300 |

Unit IV "Practice Test"
Chapter 9 Problems

For #7–10, use the traditional method of hypothesis testing.

6. Two brands of batteries are tested, and their voltage is compared. The summary statistics are recorded below for brand 1 and brand 2. Notice that the population standard deviations are given. Assume that both variables are normally distributed. Find the 95% confidence interval of the true difference in the means.

Brand 1	Brand 2
$\overline{X}_1 = 9.2$ V	$\overline{X}_2 = 8.8$ V
$\sigma_1 = 0.3$ V	$\sigma_2 = 0.1$ V
$n_1 = 27$	$n_2 = 30$

7. Two brands of batteries are tested, and their voltage is compared. The summary statistics are recorded above for brand 1 and brand 2. Assume that both variables are normally distributed. At $\alpha = 0.02$, is there sufficient evidence to conclude that there is a significant difference in the average voltage of the two brands? Use the p-value in your conclusion.

8. The local branch of the IRS spent an average of 21 minutes helping each of 10 people prepare their tax returns. The standard deviation for this sample was 5.6 minutes. A volunteer tax preparer spent an average of 27 minutes helping 14 people prepare their taxes. The standard deviation for this sample was 4.3 minutes. At $\alpha = 0.02$, is there sufficient evidence to conclude that there is a significant difference in the average time spent by the two services? Also find the 98% confidence interval for the difference between the two means.

9. A researcher wanted to compare the pulse rates of identical twins to see whether there was any difference. Eight sets of twins were selected. At $\alpha = 0.01$, is there a significant difference in the average pulse rates of twins? Also find the 99% confidence interval for the difference of the two means.

Twin A	87	92	78	83	88	90	84	93
Twin B	83	95	79	83	86	93	80	86

10. A sample of 150 people from a certain industrial community showed that 80 people suffered from a lung disease. A sample of 100 people from a rural community showed that 30 people suffered from the same lung disease. At $\alpha = 0.05$, is there a significant difference between the proportion of people who suffer from the lung disease in the two communities?

Part II
Chapter 10 Problems

11. The equation of the regression line is calculated to be y' $= 42.5146 + 0.5238$x.

    The slope of the line is _____ and the y-intercept is _____ .

12. In a sentence, describe the relationship between the two variables if the Pearson Product Moment Correlation coefficient is

    (a) 0   _____

    (b) 1   _____

    (c) -1   _____

13. A correlation coefficient of r = 0.7654 was computed for n = 15. Using Table A-5, with $\alpha = 0.05$, what are the critical values? _____

Under these circumstances, what is the appropriate decision about $H_0: \rho = 0$?
_____

14. The following chart represents a sample of 10 car models, with the weight of the car (in pounds) and the fuel efficiency (in miles per gallon) achieved in a 150-mile test drive for *Consumer Reports*.
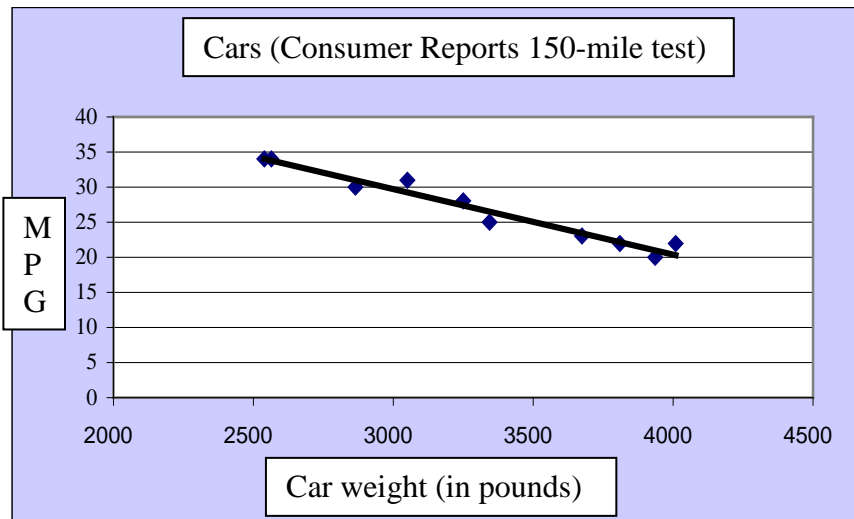
Model	Weight	MPG
BMW 3-Series	3250	28
BMW 5-Series	3675	23
Cadillac Seville	3935	20
Ford Crown Victoria	4010	22
Ford Escort	2565	34
Ford Taurus	3345	25
Honda Accord	3050	31
Honda Civic	2540	34
Honda Prelude	2865	30
Lincoln Mark VIII	3810	22

Use your TI graphing calculator to compute the r value and the equation of the regression line of best fit (using y' = a + bx form). Use 4 decimal places for each value.

(a) r = _____

(b) Equation:_____

(c) Use your equation to predict the fuel efficiency of a Ford Mustang GT which weighs 3,540 pounds. (Round to the nearest tenth.)

(d) Use your equation to predict the fuel efficiency of a Dodge Charger which weighs 3,860 pounds. (Round to the nearest tenth.)

15. Given the following costs of a 30-second ad for various Super Bowl games, perform a hypothesis test involving the population correlation coefficient involving ad costs for all Super Bowls (past, present, and future). Use $\alpha = 0.05$.

Year	Cost
1993	$850,000
1994	$900,000
1995	$1,150,000
1996	$1,085,000
1997	$1,200,000
1998	$1,300,000
1999	$1,600,000
2000	$2,200,000
2001	$2,100,000
2002	$1,900,000
2003	$2,100,000
2004	$2,300,000
2005	$2,400,000
2006	$2,500,000
2007	$2,600,000
2008	$2,700,000
2009	$2,800,000
2010	$2,900,000
2011	$3,100,000
2012	$3,500,000
2013	$3,800,000
2014	$4,000,000
2015	

(a) H_0: _____

H_1: _____

Claim:

Test statistic:

Critical value(s):

Decision:

Conclusion:

(b) If the correlation is significant, find the line of best fit.

Equation: _____

(c) Use this linear regression line to predict the cost of a 30-second ad for 2015 (write in the chart above) and

2016	
2020	
2025	

(d) Based on your R^2 value, _____ % of the variation of ad costs (y) is explained by changes in the year (x).

(e) The slope of the regression line is _____ . What is the meaning of the slope in the context of this data set?

Do your best! Rise to the challenge! Live and learn!