Exam

Name_____

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Test the claim that the samples come from populations with the same mean. Assume that the populations are normally distributed with the same variance.

1) Random samples of four different models of cars were selected and the gas mileage of each car was measured. The results are shown below. 1) _____

Model A	Model B	Model C	Model D
23	28	30	25
25	26	28	26
24	29	32	25
26	30	27	28

Test the claim that the four different models have the same population mean. Use a significance level of 0.05.

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Find the explained variation for the paired data.

2) The equation of the regression line for the paired data below is $\hat{y} = 3x$. Find the explained variation. 2) _____

x	2	4	5	6
y	7	11	13	20

A) 72.45 B) 78.75 C) 10.00 D) 88.75

3) The paired data below consists of heights and weights of 6 randomly selected adults. The equation of the regression line is $\hat{y} = -181.342 + 144.46x$. Find the explained variation. 3) _____

x Height (meters)	1.61	1.72	1.78	1.80	1.67	1.88
y Weight (kg)	54	62	70	84	61	92

A) 100.06 B) 1149.2 C) 979.44 D) 1079.5

Provide an appropriate response.

4) The table below summarizes results from an experiment in which subjects were classified as hyperactive or nonhyperactive and then given a treatment. After the treatment, they were again classified as hyperactive or nonhyperactive. Which combinations of before treatment/after treatment categories will yield discordant pairs? 4) _____

		Before Treatment	
		Hyperactive	Nonhyperactive
After Treatment	Hyperactive	7	6
	Nonhyperactive	28	11

A) hyperactive/nonhyperactive and nonhyperactive/hyperactive
B) nonhyperactive/nonhyperactive and hyperactive/hyperactive
C) Only hyperactive/nonhyperactive
D) Only nonhyperactive/nonhyperactive

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

5) The following data contains task completion times, in minutes, categorized according to the gender of the machine operator and the machine used. 5) _____

	Male	Female
Machine 1	15, 17	16, 17
Machine 2	14, 13	15, 13
Machine 3	16, 18	17, 19

Assume that two–way ANOVA is used to analyze the data. How are the ANOVA results affected if 5 minutes is added to each completion time?

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

6) The table below summarizes results from an experiment in which subjects were classified as asthmatic or nonasthmatic and then given a treatment. After the treatment, they were again classified as asthmatic or nonasthmatic. Using a 0.05 significance level, find the critical value. 6) _____

		Before Treatment	
		Asthmatic	Nonasthmatic
After Treatment	Asthmatic	9	2
	Nonasthmatic	15	6

A) 5.024 B) 7.879 C) 3.841 D) 6.635

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

7) The following data contains task completion times, in minutes, categorized according to the gender of the machine operator and the machine used. 7) _____

	Male	Female
Machine 1	15, 17	16, 17
Machine 2	14, 13	15, 13
Machine 3	16, 18	17, 19

Assume that two–way ANOVA is used to analyze the data. How are the ANOVA results affected if the first sample value in the first cell is changed to 30 minutes?

8) Use the data given below to verify that the t test for independent samples and the ANOVA method are equivalent. 8) _____

A	B
10	19
29	18
11	27
19	30
15	18
16	21

i) Use a t test with a 0.05 significance level to test the claim that the two samples come from populations with the same means.
ii) Use the ANOVA method with a 0.05 significance level to test the same claim.
iii) Verify that the squares of the t test statistic and the critical value are equal to the F test statistic and critical value.

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

9) For the data below, determine the logarithmic equation, $\hat{y} = a + b \ln x$ that best fits the data. Hint: Begin by replacing each x–value with ln x then use the usual methods to find the equation of the least squares regression line. 9) _____

x	1.2	2.7	4.4	6.6	9.5
y	1.6	4.7	8.9	9.5	12.0

A) $\hat{y} = 0.881 + 4.86 \ln x$
B) $\hat{y} = 0.457 + 5.06 \ln x$
C) $\hat{y} = -1.81 + 6.91 \ln x$
D) $\hat{y} = -0.458 + 5.36 \ln x$

10) Fill in the missing entries in the following partially completed one-way ANOVA table. 10) _____

Source	df	SS	MS=SS/df	F-statistic
Treatment	3			11.16
Error		13.72	0.686	
Total				

A)

Source	df	SS	MS=SS/df	F-statistic
Treatment	3	22.97	7.66	11.16
Error	20	13.72	0.686	
Total	23	36.69		

B)

Source	df	SS	MS=SS/df	F-statistic
Treatment	3	0.184	0.061	11.16
Error	20	13.72	0.686	
Total	23	13.90		

C)

Source	df	SS	MS=SS/df	F-statistic
Treatment	3	48.80	16.27	11.16
Error	20	13.72	0.686	
Total	23	62.52		

D)

Source	df	SS	MS=SS/df	F-statistic
Treatment	3	2.55	7.66	11.16
Error	20	13.72	0.686	
Total	23	16.27		

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

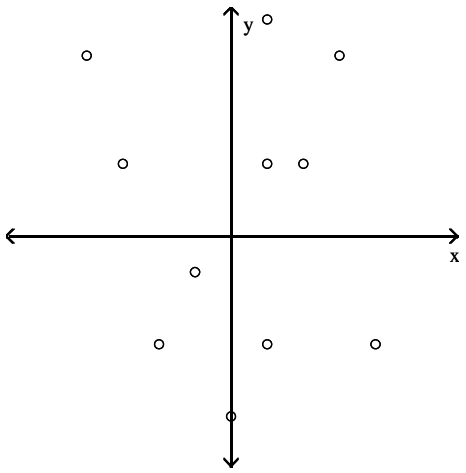
11) The following data shows annual income, in thousands of dollars, categorized according to the two factors of gender and level of education. Assume that incomes are not affected by an interaction between gender and level of education, and test the null hypothesis that gender has no effect on income. Use a 0.05 significance level. 11) _____

	Female	Male
High school	23, 27, 24, 26	25, 26, 22, 24
College	28, 36, 31, 33	35, 32, 39, 28
Advanced degree	41, 38, 43, 49	35, 50, 47, 44

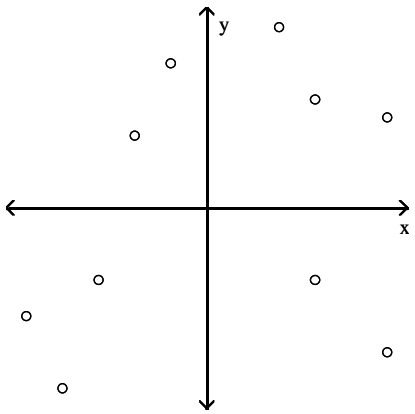
MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

12) Determine which plot shows the strongest linear correlation. 12) _____

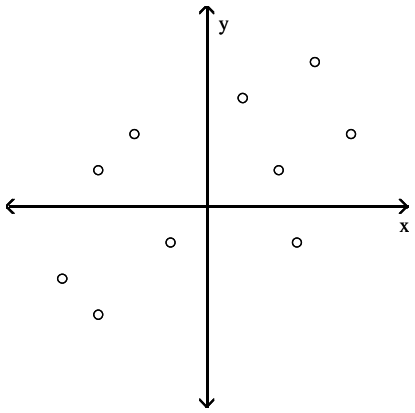
A)



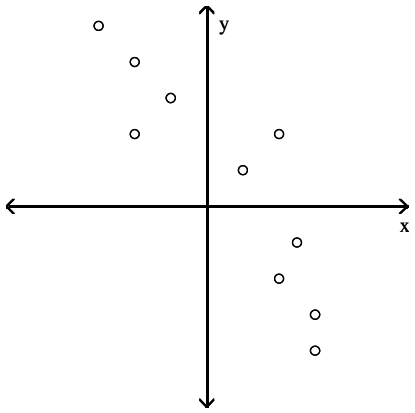
B)



C)



D)



13) The table below summarizes results from an experiment in which subjects were classified as asthmatic or nonasthmatic and then given a treatment. After the treatment, they were again classified as asthmatic or nonasthmatic. How many subjects changed their asthmatic/nonasthmatic status after the experiment? 13) _____

		Before Treatment	
		Asthmatic	Nonasthmatic
After Treatment	Asthmatic	9	2
	Nonasthmatic	15	6

A) 17 B) 16 C) 15 D) 32

14) For the data below, determine the value of the linear correlation coefficient r between y and x^2. 14) _____

x	1.2	2.7	4.4	6.6	9.5
y	1.6	4.7	9.9	24.5	39.0

A) 0.985 B) 0.913 C) 0.873 D) 0.990

15) The table below summarizes results from an experiment in which subjects were classified as asthmatic or nonasthmatic and then given a treatment. After the treatment, they were again classified as asthmatic or nonasthmatic. How many subjects were included in the experiment? 15) _____

		Before Treatment	
		Asthmatic	Nonasthmatic
After Treatment	Asthmatic	9	2
	Nonasthmatic	15	6

A) 32 B) 24 C) 15 D) 8

16) The table below summarizes results from an experiment in which subjects were classified as asthmatic or nonasthmatic and then given a treatment. After the treatment, they were again classified as asthmatic or nonasthmatic.Using the appropriate frequencies, find the value of the test statistic. Round to three decimal places if necessary. 16) _____

		Before Treatment	
		Asthmatic	Nonasthmatic
After Treatment	Asthmatic	9	2
	Nonasthmatic	15	6

A) 8.471 B) 9.941 C) 9.882 D) 0.701

17) Fill in the missing entries in the following partially completed one–way ANOVA table. 17) _____

Source	df	SS	MS=SS/df	F-statistic
Treatment		21.8		
Error	21		3.7	
Total	26			

A)

Source	df	SS	MS=SS/df	F-statistic
Treatment	5	21.8	4.36	0.85
Error	21	77.7	3.7	
Total	26	99.5		

B)

Source	df	SS	MS=SS/df	F-statistic
Treatment	47	21.8	0.46	276.92
Error	21	77.7	3.7	
Total	26	99.5		

C)

Source	df	SS	MS=SS/df	F-statistic
Treatment	5	21.8	4.36	1.18
Error	21	77.7	3.7	
Total	26	21.98		

D)

Source	df	SS	MS=SS/df	F-statistic
Treatment	5	21.8	4.36	1.18
Error	21	77.7	3.7	
Total	26	99.5		

18) The table below summarizes results from an experiment in which subjects were classified as asthmatic or nonasthmatic and then given a treatment. After the treatment, they were again classified as asthmatic or nonasthmatic. How many subjects appeared to be unaffected by the treatment one way or the other? 18) _____

		Before Treatment	
		Asthmatic	Nonasthmatic
After Treatment	Asthmatic	9	2
	Nonasthmatic	15	6

A) 15 B) 8 C) 32 D) 17

19) The table below summarizes results from an experiment in which subjects were classified as asthmatic or nonasthmatic and then given a treatment. After the treatment, they were again classified as asthmatic or nonasthmatic. Identify the discordant pairs of results. 19) _____

		Before Treatment	
		Asthmatic	Nonasthmatic
After Treatment	Asthmatic	7	2
	Nonasthmatic	13	10

A) The discordant pairs of results are (1) the 13 subjects who were asthmatic before the treatment and nonasthmatic after the treatment, and (2) the 10 subjects who were nonasthmatic before the treatment and nonasthmatic after the treatment.

B) The discordant pairs of results are (1) the 2 subjects who were nonasthmatic before the treatment and asthmatic after the treatment, and (2) the 13 subjects who were asthmatic before the treatment and nonasthmatic after the treatment.

C) The discordant pairs of results are (1) the 2 subjects who were nonasthmatic before the treatment and asthmatic after the treatment, and (2) the 7 subjects who were asthmatic before the treatment and asthmatic after the treatment.

D) The discordant pairs of results are (1) the 13 subjects who were nonasthmatic before the treatment and asthmatic after the treatment and (2) the 2 subjects who were asthmatic before the treatment and nonasthmatic after the treatment.

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Use the data in the given table and the corresponding Minitab display to test the hypothesis.

20) The following table shows the mileage for four different cars and three different brands of gas. Assuming no effect from the interaction between car and brand of gas, test the claim that the four cars have the same mean mileage. Use a 0.05 significance level. 20) _____

	Brand 1	Brand 2	Brand 3
Car 1	22.4	25.2	24.3
Car 2	19	18.6	19.8
Car 3	24.6	25	25.4
Car 4	23.5	23.6	24.1

Source	DF	SS	MS	F	p
Car	3	61.249	20.416	39.033	0.000249
Gas	2	2.222	1.111	2.124	0.200726
Error	6	3.138	0.523		
Total	11	66.609			

21) The following Minitab display results from a study in which three different teachers taught calculus classes of five different sizes. The class average was recorded for each class. Assuming no effect from the interaction between teacher and class size, test the claim that class size has no effect on the class average. Use a 0.05 significance level. 21) _____

Source	DF	SS	MS	F	p
Teacher	2	56.93	28.47	1.018	0.404
Class Size	4	672.67	168.17	6.013	0.016
Error	8	223.73	27.97		
Total	14	953.33			

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Construct a confidence interval for μ_d, the mean of the differences d for the population of paired data. Assume that the population of paired differences is normally distributed.

22) If $\overline{d} = 3.125$, $S_d = 2.911$, and $n = 8$, determine a 95 percent confidence interval for μ_d. 22) _____

A) $2.264 < \mu_d < 5.559$
B) $0.691 < \mu_d < 3.986$
C) $2.264 < \mu_d < 3.986$
D) $0.691 < \mu_d < 5.559$

Determine the decision criterion for rejecting the null hypothesis in the given hypothesis test; i.e., describe the values of the test statistic that would result in rejection of the null hypothesis.

23) Suppose you wish to test the claim that μ_d, the mean value of the differences d for a population of paired data, is different from 0. Given a sample of $n = 23$ and a significance level of $\alpha = 0.05$, what criterion would be used for rejecting the null hypothesis? 23) _____

A) Reject null hypothesis if test statistic > 2.074 or < –2.074.
B) Reject null hypothesis if test statistic > 2.069 or < –2.069.
C) Reject null hypothesis if test statistic > 1.717.
D) Reject null hypothesis if test statistic > 1.717 or < –1.717.

24) A farmer has decided to use a new additive to grow his crops. He divided his farm into 10 plots and kept records of the corn yield (in bushels) before and after using the additive. The results are shown below. 24) _____

Plot:	1	2	3	4	5	6	7	8	9	10
Before	9	9	8	7	6	8	5	9	10	11
After	10	9	9	8	7	10	6	10	10	12

You wish the test the following hypothesis at the 1 percent level of significance.

$H_0: \mu_d = 0$ against $H_1: \mu_d > 0$.

What decision rule would you use?

A) Reject H_0 if test statistic is greater than 2.821.
B) Reject H_0 if test statistic is less than 2.821.
C) Reject H_0 if test statistic is greater than –2.821 or less than 2.821.
D) Reject H_0 if test statistic is greater than –2.821.

25) We wish to compare the means of two populations using paired observations. Suppose that $\overline{d} = 3.125$, $S_d = 2.911$, and $n = 8$, and that you wish to test the following hypothesis at the 10% level of significance: 25) _____

$H_0: \mu_d = 0$ against $H_1: \mu_d > 0$.

What decision rule would you use?

A) Reject H_0 if test statistic is greater than –1.415 and less than 1.415.

B) Reject H_0 if test statistic is greater than 1.415.

C) Reject H_0 if test statistic is greater than –1.415.

D) Reject H_0 if test statistic is less than 1.415.

26) A farmer has decided to use a new additive to grow his crops. He divided his farm into 10 plots and kept records of the corn yield (in bushels) before and after using the additive. The results are shown below. 26) _____

Plot:	1	2	3	4	5	6	7	8	9	10
Before	9	9	8	7	6	8	5	9	10	11
After	10	9	9	8	7	10	6	10	10	12

You wish to test the following hypothesis at the 10 percent level of significance.

$H_0: \mu_d = 0$ against $H_1: \mu_d \neq 0$.

What decision rule would you use?

A) Reject H_0 if test statistic is greater than –1.833 or less than 1.833.

B) Reject H_0 if test statistic is greater than 1.833.

C) Reject H_0 if test statistic is less than –1.833.

D) Reject H_0 if test statistic is less than –1.833 or greater than 1.833.

Find s_d.

27) Consider the set of differences between two dependent sets: 84, 85, 83, 63, 61, 100, 98. Round to the nearest tenth. 27) _____

A) 15.7 B) 16.2 C) 15.3 D) 13.1

28) The differences between two sets of dependent data are 0.24, 0.34, 0.3, 0.38, 0.4. Round to the nearest hundredth. 28) _____

A) 0.06 B) 0.18 C) 0.03 D) 0.09

29) The differences between two sets of dependent data are –3, 4, –4, 3. Round to the nearest tenth. 29) _____

A) 94.3 B) 2.1 C) 3.3 D) 4.1

Assume that you plan to use a significance level of $\alpha = 0.05$ to test the claim that $p_1 = p_2$. Use the given sample sizes and numbers of successes to find the z test statistic for the hypothesis test.

30) Information about movie ticket sales was printed in a movie magazine. Out of fifty PG–rated movies, 35% had ticket sales in excess of $3,000,000. Out of thirty–five R–rated movies, 22% grossed over $3,000,000. 30) _____

A) z = 1.292 B) z = 2.584 C) z = 4.005 D) z = 2.067

31) A report on the nightly news broadcast stated that 10 out of 108 households with pet dogs were burglarized and 20 out of 208 without pet dogs were burglarized. 31) _____

A) $z = 0.000$ B) $z = -0.173$ C) $z = -0.102$ D) $z = -0.041$

32) $n_1 = 155$ $n_2 = 146$ 32) _____

$x_1 = 68$ $x_2 = 59$

A) $z = 0.607$ B) $z = 0.435$ C) $z = 13.865$ D) $z = 7.466$

33) A random sampling of sixty pitchers from the National League and fifty-two pitchers from the American League showed that 19 National and 11 American League pitchers had E.R.A's below 3.5. 33) _____

A) $z = 1.253$ B) $z = 191.183$ C) $z = 15.457$ D) $z = 1.629$

Find the total variation for the paired data.

34) The paired data below consists of heights and weights of 6 randomly selected adults. The equation of the regression line is $\hat{y} = -181.342 + 144.46x$. Find the total variation. 34) _____

x Height (meters)	1.61	1.72	1.78	1.80	1.67	1.88
y Weight (kg)	54	62	70	84	61	92

A) 1,119.3 B) 979.44 C) 1,079.5 D) 100.06

35) The equation of the regression line for the paired data below is $\hat{y} = 3x$. Find the total variation. 35) _____

x	2	4	5	6
y	7	11	13	20

A) 88.75 B) 78.75 C) 92.25 D) 10.00

Find the number of successes x suggested by the given statement.

36) A computer manufacturer randomly selects 2850 of its computers for quality assurance and finds that 1.79% of these computers are found to be defective. 36) _____

A) 54 B) 56 C) 51 D) 49

Construct the indicated prediction interval for an individual y.

37) The regression equation for the given paired data is $\hat{y} = 73.012 + 0.8859x$ and the standard error of estimate is $s_e = 2.78807$. Find the 95% prediction interval of $\hat{y}$ for $x = 37$. 37) _____

x	25	26	36	36	40	48
y	95	95	102	109	110	114

A) $97.4 < y < 114.2$ B) $73.0 < y < 114.2$ C) $97.4 < y < 10.8$ D) $73.0 < y < 105.8$

Solve the problem.

38) A confidence interval for the slope β_1 for a regression line $y = \beta_0 + \beta_1 x$ can be found by evaluating the limits in the interval below: 38) _____

$$b_1 - E < \beta_1 < b_1 + E,$$

where $E = \dfrac{(t_{\alpha/2})\, s_e}{\sqrt{\sum x^2 - \left(\sum x\right)^2/n}}$.

The critical value $t_{\alpha/2}$ is found from the t–table using n – 2 degrees of freedom and b_1 is calculated in the usual way from the sample data.

Use the data below to obtain a 95% confidence interval estimate of β_1 .

x (hours studied)	2.5	4.5	5.1	7.9	11.6
y (score on test)	66	70	60	83	93

A) $1.936 < \beta_1 < 4.874$ B) $0.686 < \beta_1 < 6.124$

C) $0.322 < \beta_1 < 6.488$ D) $0.134 < \beta_1 < 6.676$

39) A manager at a bank is interested in the standard deviation of the waiting times when a single waiting line is used and when individual lines are used. He wishes to test the claim that the population standard deviation for waiting times when multiple lines are used is greater than the population standard deviation for waiting times when a single line is used. Find the P–value for a test of this claim given the following sample data. You won't be able to find the exact P–value, but will be able to give a range of possible values. 39) _____

Sample 1: multiple waiting lines: $n_1 = 13$, $s_1 = 2.1$ minutes

Sample 2: single waiting line: $n_2 = 16$, $s_2 = 1.1$ minutes

A) $0.02 < P\text{–value} < 0.05$ B) $0.005 < P\text{–value} < 0.01$

C) $0.025 < P\text{–value} < 0.05$ D) $0.01 < P\text{–value} < 0.025$

40) In the context of regression, determine whether the following statement is true or false: 40) _____

If there is a very strong correlation between x and y, the amount of unexplained variation should be relatively large.

A) True B) False

Given below are the analysis of variance results from a Minitab display. Assume that you want to use a 0.05 significance level in testing the null hypothesis that the different samples come from populations with the same mean.

41) Identify the p–value. 41) _____

Source	DF	SS	MS	F	p
Factor	3	30	10.00	1.6	0.264
Error	8	50	6.25		
Total	11	80			

A) 0.264 B) 1.6 C) 10.00 D) 6.25

42) Identify the p–value. 42) _____

Source	DF	SS	MS	F	p
Factor	3	13.500	4.500	5.17	0.011
Error	16	13.925	0.870		
Total	19	27.425			

A) 5.17 B) 0.870 C) 4.500 D) 0.011

43) What can you conclude about the equality of the population means? 43) _____

Source	DF	SS	MS	F	p
Factor	3	13.500	4.500	5.17	0.011
Error	16	13.925	0.870		
Total	19	27.425			

A) Accept the null hypothesis since the p–value is greater than the significance level.
B) Reject the null hypothesis since the p–value is greater than the significance level.
C) Accept the null hypothesis since the p–value is less than the significance level.
D) Reject the null hypothesis since the p–value is less than the significance level.

44) Identify the value of the test statistic. 44) _____

Source	DF	SS	MS	F	p
Factor	3	13.500	4.500	5.17	0.011
Error	16	13.925	0.870		
Total	19	27.425			

A) 13.500 B) 0.011 C) 5.17 D) 4.500

45) Find the critical value. 45) _____

Source	DF	SS	MS	F	p
Factor	3	13.500	4.500	5.17	0.011
Error	16	13.925	0.870		
Total	19	27.425			

A) 8.70 B) 5.42 C) 3.24 D) 3.06

46) Find the critical value. 46) _____

Source	DF	SS	MS	F	p
Factor	3	30	10.00	1.6	0.264
Error	8	50	6.25		
Total	11	80			

A) 4.07 B) 8.85 C) 1.6 D) 7.59

Use the given data to find the equation of the regression line. Round the final values to three significant digits, if necessary.

47) 47) _____

x	24	26	28	30	32
y	15	13	20	16	24

A) $\hat{y} = -11.8 + 1.05x$ B) $\hat{y} = 11.8 + 1.05x$
C) $\hat{y} = 11.8 + 0.950x$ D) $\hat{y} = -11.8 + 0.950x$

48)

x	3	5	7	15	16
y	8	11	7	14	20

48) _____

A) $\hat{y} = 5.07 + 0.753x$
B) $\hat{y} = 4.07 + 0.850x$
C) $\hat{y} = 4.07 + 0.753x$
D) $\hat{y} = 5.07 + 0.850x$

49)

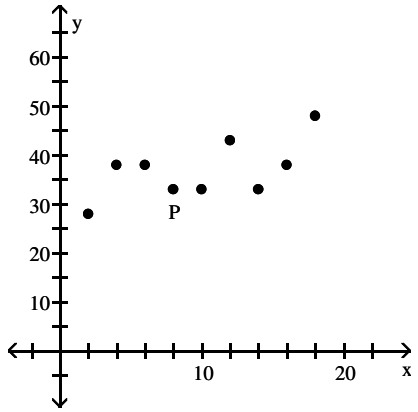
x	1	3	5	7	9
y	143	116	100	98	90

49) _____

A) $\hat{y} = -140.4 + 6.2x$
B) $\hat{y} = 140.4 - 6.2x$
C) $\hat{y} = -150.7 + 6.8x$
D) $\hat{y} = 150.7 - 6.8x$

Is the data point, P, an outlier, an influential point, both, or neither?

50) 50) _____



A) Neither
B) Both
C) Influential point
D) Outlier

Construct a scatterplot and identify the mathematical model that best fits the data. Assume that the model is to be used only for the scope of the given data and consider only linear, quadratic, logarithmic, exponential, and power models. Use a calculator or computer to obtain the regression equation of the model that best fits the data. You may need to fit several models and compare the values of R^2.

51) A rock is dropped from a tall building and its distance (in feet) below the point of release is recorded as accurately as possible at various times after the moment of release. The results are shown in the table. Find the regression equation of the best model. 51) _____

x (seconds after release)	1	2	3	4	5	6
y (distance in feet)	16	63	146	255	403	572

A) $y = 15.95\ x^2$
B) $y = -148.4 + 112\ x$
C) $y = -74.9 + 290 \ln x$
D) $y = 13.0\ e^{0.686\ x}$

52) 52) _____

x	1	2	3	4	5
y	7	17	20	25	28

A) $y = 7.82\ x^{0.844}$
B) $y = 4.40 + 5.00\ x$
C) $y = 6.81\ e^{0.316x}$
D) $y = 7.19 + 12.8 \ln x$

53) 53) _____

x	1	2	3	4	5	6
y	9	13	25	27	31	46

A) $y = 4.87 + 18.5 \ln x$
B) $y = 8.34\, x^{0.88}$
C) $y = 1.07 + 6.89\, x$
D) $y = 3.14 + 6.59\, x$

54) 54) _____

x	1	2	3	4	5
y	3	9	17	30	40

A) $y = 2.96\, x^{1.628}$
B) $y = -1.59 + 22.3 \ln x$
C) $y = -8.70 + 9.50\, x$
D) $y = 2.07\, e^{0.638x}$

Find the indicated multiple regression equation.

55) Below are performance and attitude ratings of employees. 55) _____

Performance	59	63	65	69	58	77	76	69	70	64
Attitude	72	67	78	82	75	87	92	83	87	78

Managers also rate the same employees according to adaptability, and below are the results that correspond to those given above.

Adaptability : 50 52 54 60 46 67 66 59 62 55

Find the multiple regression equation that expresses performance in terms of attitude and adaptability.

A) $\hat{P} = 14.09 + 0.014(\text{Att.}) + 0.907(\text{Adapt.})$
B) $\hat{P} = 14.09 + 0.213(\text{Att.}) + 0.895(\text{Adapt.})$
C) $\hat{P} = 14.09 + 0.895(\text{Att.}) + 0.213(\text{Adapt.})$
D) $\hat{P} = 14.09 + 0.907(\text{Att.}) + 0.014(\text{Adapt.})$

56) Below are the productivity, dexterity, and job satisfaction ratings of ten randomly selected employees. 56) _____

Productivity	23	25	28	21	21	25	26	30	34	36
Dexterity	49	53	59	42	47	53	55	63	67	75
Job satisfaction	56	58	60	50	54	61	59	63	67	69

Find the multiple regression equation that expresses the job satisfaction scores in terms of the productivity and dexterity scores.

A) $\hat{S} = 28.28 + 0.011P + 0.437D$
B) $\hat{S} = 28.28 + 0.0860P + 0.517D$
C) $\hat{S} = 28.28 + 0.517P + 0.0860D$
D) $\hat{S} = 28.28 + 0.237P + 0.728D$

57) A fitness rating was obtained for 9 randomly selected adult women. Each person was also asked her age, weight, and the number of hours she spent exercising each week. The results are shown below. 57) _____

Age	39	27	41	48	56	59	22	64	35
Weight	140	129	137	125	162	152	118	142	126
Hours of exercise per week	2	6	4	9	0	3	11	3	4
Fitness rating	72	88	63	84	47	52	90	31	64

Identify the multiple regression equation that expresses fitness in terms of age, weight, and hours of exercise per week.

A) $\hat{F} = 36.07 - 1.02A + 0.429W + 3.30E$
B) $\hat{F} = 23.79 - 1.36A + 0.241W + 1.43E$
C) $\hat{F} = 52.46 - 2.14A + 1.39W + 2.48E$
D) $\hat{F} = 45.12 - 0.918A + 0.461W + 2.34E$

Use the given data to find the best predicted value of the response variable.

58) The regression equation relating dexterity scores (x) and productivity scores (y) for the employees of a company is $\hat{y} = 5.50 + 1.91x$. Ten pairs of data were used to obtain the equation. The same data yield $r = 0.986$ and $\bar{y} = 56.3$. What is the best predicted productivity score for a person whose dexterity score is 32? 58) _____

A) 58.20 B) 66.62 C) 56.30 D) 177.91

59) The regression equation relating attitude rating (x) and job performance rating (y) for the employees of a company is $\hat{y} = 11.7 + 1.02x$. Ten pairs of data were used to obtain the equation. The same data yield $r = 0.863$ and $\bar{y} = 80.1$. What is the best predicted job performance rating for a person whose attitude rating is 77? 59) _____

A) 88.9 B) 90.2 C) 80.1 D) 12.6

Assume that you plan to use a significance level of $\alpha = 0.05$ to test the claim that $p_1 = p_2$. Use the given sample sizes and numbers of successes to find the P–value for the hypothesis test.

60) $n_1 = 200$ $n_2 = 100$ 60) _____

$x_1 = 11$ $x_2 = 8$

A) 0.0201 B) 0.4010 C) 0.1011 D) 0.0012

61) $n_1 = 50$ $n_2 = 75$ 61) _____

$x_1 = 20$ $x_2 = 15$

A) 0.0032 B) 0.0001 C) 0.0146 D) 0.1201

Suppose you will perform a test to determine whether there is sufficient evidence to support a claim of a linear correlation between two variables. Find the critical values of r given the number of pairs of data n and the significance level α.

62) $n = 14$, $\alpha = 0.05$ 62) _____

A) $r = 0.532$ B) $r = \pm 0.532$ C) $r = \pm 0.661$ D) $r = 0.553$

63) $n = 17$, $\alpha = 0.05$ 63) _____

A) $r = \pm 0.482$ B) $r = 0.482$ C) $r = \pm 0.606$ D) $r = 0.497$

Find the test statistic χ^2 by McNemar's test.

64) categorical data: a =25, b = 15, c = 20, d = 10 64) _____

A) 2.314 B) 0.457 C) 1.029 D) 5.600

Assume that you want to test the claim that the paired sample data come from a population for which the mean difference is $\mu_d = 0$. Compute the value of the t test statistic. Round intermediate calculations to four decimal places as needed and final answers to three decimal places as needed.

65) The following table shows the weights of nine subjects before and after following a particular diet for two months. You wish to test the claim that the diet is effective in helping people lose weight. What is the value of the appropriate test statistic? 65) _____

Subject	A	B	C	D	E	F	G	H	I
Before	168	180	157	132	202	124	190	210	171
After	162	178	145	125	171	126	180	195	163

A) 9.468 B) 1.052 C) 3.156 D) 0.351

66)

x	34	39	28	33	27	23	35	33
y	32	35	34	33	28	28	35	32

66) _____

A) t = –0.523 B) t = 0.690 C) t = –0.185 D) t = –1.480

67)

x	8	4.4	4.2	8.8	5.9	12.1	8.5	7.7
y	6.2	4.1	5.3	4.1	6.3	6.8	4.6	6

67) _____

A) t = 0.998 B) t = 0.845 C) t = 6.792 D) t = 2.391

68)

x	8	4	12	2	9
y	5	6	8	3	4

68) _____

A) t = 1.292 B) t = 2.890 C) t = 0.578 D) t = 0.415

Assume that you plan to use a significance level of $\alpha = 0.05$ to test the claim that $p_1 = p_2$. Use the given sample sizes and numbers of successes to find the pooled estimate $\bar{p}$. Round your answer to the nearest thousandth.

69) $n_1 = 100$ $n_2 = 100$ 69) _____

$x_1 = 32$ $x_2 = 33$

A) 0.358 B) 0.325 C) 0.227 D) 0.293

Find the value of the linear correlation coefficient r.

70) The paired data below consist of the test scores of 6 randomly selected students and the number of hours they studied for the test. 70) _____

Hours	5	10	4	6	10	9
Score	64	86	69	86	59	87

A) 0.224 B) 0.678 C) –0.224 D) –0.678

71) A study was conducted to compare the average time spent in the lab each week versus course grade for computer programming students. The results are recorded in the table below. 71) _____

Number of hours spent in lab	Grade (percent)
10	96
11	51
16	62
9	58
7	89
15	81
16	46
10	51

A) 0.017 B) –0.284 C) 0.462 D) –0.335

Construct the indicated confidence interval for the difference between the two population means. Assume that the two samples are independent simple random samples selected from normally distributed populations. Do not assume that the population standard deviations are equal.

72) Independent samples from two different populations yield the following data. $\bar{x}_1 = 236$, $\bar{x}_2 = 905$, $s_1 = 88$, $s_2 = 13$. The sample size is 381 for both samples. Find the 85% confidence interval for $\mu_1 - \mu_2$. 72) _____

A) $-683 < \mu_1 - \mu_2 < -655$ B) $-677 < \mu_1 - \mu_2 < -661$

C) $-670 < \mu_1 - \mu_2 < -668$ D) $-676 < \mu_1 - \mu_2 < -662$

Use the given information to find the coefficient of determination.

73) Find the coefficient of determination, given that the value of the linear correlation coefficient, r, is 0.419. 73) _____

A) 0.581 B) 0.824 C) 0.419 D) 0.176

74) A regression equation is obtained for a collection of paired data. It is found that the total variation is 24.488, the explained variation is 15.405, and the unexplained variation is 9.083. Find the coefficient of determination. 74) _____

A) 0.371 B) 1.590 C) 0.629 D) 0.590

Find the unexplained variation for the paired data.

75) The paired data below consists of heights and weights of 6 randomly selected adults. The equation of the regression line is $\hat{y} = -181.342 + 144.46x$. Find the unexplained variation. 75) _____

x Height (meters)	1.61	1.72	1.78	1.80	1.67	1.88
y Weight (kg)	54	62	70	84	61	92

A) 119.3 B) 1079.5 C) 979.44 D) 100.06

76) The equation of the regression line for the paired data below is $\hat{y} = 6.18286 + 4.33937x$. Find the unexplained variation. 76) _____

x	9	7	2	3	4	22	17
y	43	35	16	21	23	102	81

A) 13.479 B) 18.923 C) 6544.86 D) 6531.37

Find the standard error of estimate for the given paired data.

77) The equation of the regression line for the paired data below is $\hat{y} = 3x$. Find the standard error of estimate. 77) _____

x	2	4	5	6
y	7	11	13	20

A) 2.2361 B) 6.2750 C) 4.1892 D) 5.00

78) The paired data below consists of heights and weights of 6 randomly selected adults. The equation of the regression line is $\hat{y} = -181.342 + 144.46x$. Find the standard error of estimate. 78) _____

x Height (meters)	1.61	1.72	1.78	1.80	1.67	1.88
y Weight (kg)	54	62	70	84	61	92

A) 5.0015 B) 6.9205 C) 9.7944 D) 15.648

Given the linear correlation coefficient r and the sample size n, determine the critical values of r and use your finding to state whether or not the given r represents a significant linear correlation. Use a significance level of 0.05.

79) $r = -0.242$, $n = 90$ 79) _____

A) Critical values: $r = \pm 0.217$, no significant linear correlation

B) Critical values: $r = \pm 0.207$, significant linear correlation

C) Critical values: $r = 0.217$, significant linear correlation

D) Critical values: $r = \pm 0.207$, no significant linear correlation

Use the computer display to answer the question.

80) A collection of paired data consists of the number of years that students have studied Spanish and their scores on a Spanish language proficiency test. A computer program was used to obtain the least squares linear regression line and the computer output is shown below. Along with the paired sample data, the program was also given an x value of 2 (years of study) to be used for predicting test score. 80) _____

The regression equation is

Score = 31.55 + 10.90 Years.

Predictor	Coef	StDev	T	P
Constant	31.55	6.360	4.96	0.000
Years	10.90	1.744	6.25	0.000

S = 5.651 R–Sq = 83.0% R–Sq (Adj) = 82.7%

Predicted values

Fit	StDev Fit	95.0% CI	95.0% PI
53.35	3.168	(42.72, 63.98)	(31.61, 75.09)

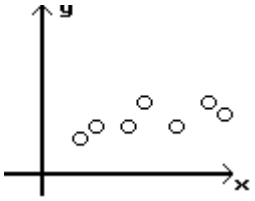
What percentage of the total variation in test scores is unexplained by the linear relationship between years of study and test scores?

A) 8.9% B) 17.0% C) 83.0% D) 82.7%

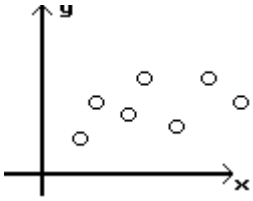
Determine which scatterplot shows the strongest linear correlation.

81) Which shows the strongest linear correlation? 81) _____

A)



B)



C)