Statistics 300
Quiz #14 **Name:** _____

(8 points : 15 minutes)

1. **Do carpool lanes save commute time? Use the results of the experiment below to test the claim that using the carpool lane causes the average commute time to be at least 5 minutes less per trip. For the experiment, 6 randomly selected routes from the suburbs to downtown were selected. For each route, the time required was tested using the regular lanes and using the carpool lane. The data are given below.** Use a Type I error rate of 0.05 for the test.

	Time for Lane	
Route	Regular	Carpool
1	50.3	46.6
2	28.2	28.2
3	19.9	18.5
4	24.7	16.3
5	60.1	55.7
6	58.2	57.3
$\bar{x}$ =	40.23	37.07
s =	17.99	18.44
n =	6	6

Statistics 300
Quiz #14 **Name:** _____

(8 points; 12 minutes)

2. **The data are from an experiment to compare the effect of natural vitamins to synthetic vitamins. Six patients participated in the test. Each patient used the natural vitamins for 6 months and the synthetic vitamins for 6 months. The data are measurements of "energy level."**
   Use the data to construct a 98% confidence interval for ($\mu_1 - \mu_2$), the difference in mean energy level that would occur if all people participated in the experiment.

	Vitamin Treatment	
Patient	**1 = Natural**	**2 = Synthetic**
1	**8**	**6**
2	**6**	**5**
3	**6**	**5**
4	**9**	**6**
5	**7**	**8**
6	**8**	**5**
Mean	**7.3**	**5.8**
St. Dev.	**1.21**	**1.17**
n	**6**	**6**

Statistics 300
Quiz #15 **Name:** _____

(9 points:12 minutes)

1. **Some people want to compare the proportion of high school boys that smoke cigarettes to the proportion of high school girls that smoke cigarettes. Use the data below to test the claim that the proportion of boys that smoke is 5% bigger than the proportion for girls.** (Use the classical approach to hypothesis testing with a 0.10 significance level.)

smoke	Girls	Boys
Yes	407	470
No	1451	1469

Statistics 300
Quiz #15 **Name:** _____

(9 points:12 minutes)

2. **Some people want to compare the proportion of high school boys that smoke cigarettes to the proportion of high school girls that smoke cigarettes. Use the data below to test the claim that the proportion of boys that smoke is the same as the proportion for girls.** (Use the classical approach to hypothesis testing with a 0.10 significance level.)

smoke	Girls	Boys
Yes	407	470
No	1451	1469

Statistics 300
Quiz #15 **Name:** _____

(9 points:12 minutes)

3. **Some people want to compare the proportion of high school boys that are "overweight" to the proportion of high school girls that are "overweight". Use the data below to make an 80% confidence interval for the true difference between p_g (the proportion of all girls that are overweight) and p_b (the proportion of all boys that are overweight).**

Overweight	Girls	Boys
Yes	418	486
No	1451	1469

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Statistics 300
Quiz #16 **Name:** _____

(8 points : 12 minutes)

1. **A random sample of 13 Zoologists has an average weight of 106 kg with a standard deviation of 22 kg. A random sample of 17 Physicists has an average weight of 100 kg and a standard deviation of 24 kg. Use these results to construct a 95% confidence interval for the difference between the mean weight of all zoologists and the mean weight of all physicists.** (Assume that variation among weights is the same in both cases.) (You must include the algebraic expression for the test statistic as part of your answer.)

sample data		
	Zoologists	**Physicists**
n =	**13**	**17**
$\bar{x}$ **=**	**106**	**100**
s =	**22**	**24**

(8 points : 12 minutes)

2. **A random sample of 16 Zoologists has an average weight of 106 kg with a standard deviation of 28 kg. A random sample of 10 Physicists has an average weight of 100 kg and a standard deviation of 20 kg. Use these results to test the claim that the mean weight of all zoologists is more than 2 kg greater than the mean weight of all physicists.** (Assume that variation among the weights in each population may not be the same.) (You must include the algebraic expression for the test statistic as part of your answer.)

sample data		
	Zoologists	**Physicists**
n =	**16**	**10**
$\bar{x}$ **=**	**106**	**100**
s =	**28**	**20**

Statistics 300
Quiz #16 **Name:** _____

(6 points : 10 minutes)

3. **Some lawyers argue that police radar units are too variable to give reliable speed values. Police laboratories test a new radar unit that is claimed to have lower variability, and they compare its performance with an old unit. Use the test data to test the claim that the variability of the new radar unit is less than the variability of the old one. The readings from both units are normally distributed.**
   (Use a Type I error probability of 0.025.)

sample data		
	New Unit	**Old Unit**
n =	**10**	**8**
$\overline{x}$ **=**	**68.4**	**68.3**
s =	**0.22**	**0.27**

Claim: _____

H_0: _____

H_1: _____

Statistics 300
Quiz #16 **Name:** _____

(8 points : 12 minutes)

4. You run a company that produces cans of mixed nuts labled "400 grams". A requirement of the federal government is that the moisture content of the nuts (as a group) cannot be more than four percent (4 grams water per 100 grams of nuts). You have two different ways to measure the moisture content, called Method 1 and Method 2. Use the data below for 16 samples of nuts to make a 95% confidence interval for ($\mu_1 - \mu_2$), the difference between the mean for Method 1 and the mean for Method 2. Assume that the two variances are the same.
(You must include the algebraic expression for the CI in your answer.)

	Moisture (grams)	
Sample	**Method 1**	**Method 2**
1	**21.4**	**19.8**
2	**23.6**	**23.2**
3	**12.6**	**12.4**
4	**22.9**	**22.1**
5	**16.0**	**14.6**
6	**19.2**	**17.9**
7	**17.9**	**17.6**
8	**16.1**	**15.3**
$\bar{x}$ =	**18.71**	**17.86**
s =	**3.80**	**3.73**

Statistics 300
Quiz #16 **Name:** _____

(8 points : 12 minutes)

5. **You run a company that produces cans of mixed nuts labled "400 grams". A requirement of the federal government is that the moisture content of the nuts (as a group) cannot be more than four percent (4 grams water per 100 grams of nuts). You have two different ways to measure the moisture content, called Method 1 and Method 2. Use the data below to test the claim that μ_2 is at least 0.5 grams more than μ_1.** (Let α = 0.10 and assume the variances for the methods are not the same. You must include the algebraic expression for the test statistic as part of your answer.)

	Moisture (grams)	
	Method 1	**Method 2**
	20.7	**19.8**
	23.8	**23.2**
	13.0	**12.4**
	24.2	**22.1**
	15.2	**14.6**
	19.6	**17.9**
	18.6	**17.6**
	15.4	**15.3**
		18.6
		19.3
$\bar{x}$ =	**18.81**	**18.08**
s =	**4.08**	**3.32**

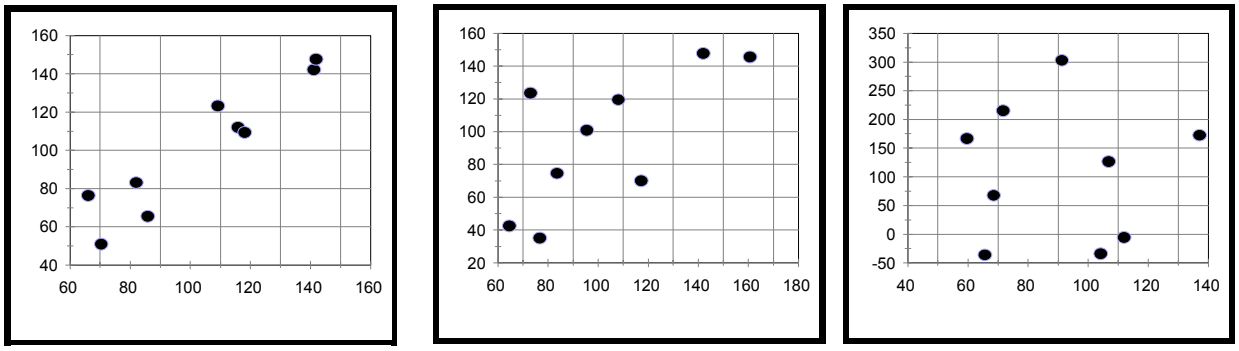
Statistics 300
Quiz #17 **Name:** _____

(3 points; 2 minutes)

1. **Assign the three sample correlation coefficients to the three pictures. A correlation value may be used more than once or not at all. If a picture has no appropriate correlation available, write NONE [do not use the zero].**

Values
0.00
0.80
0.90
NONE

r = _____ **r =** _____ **r =** _____

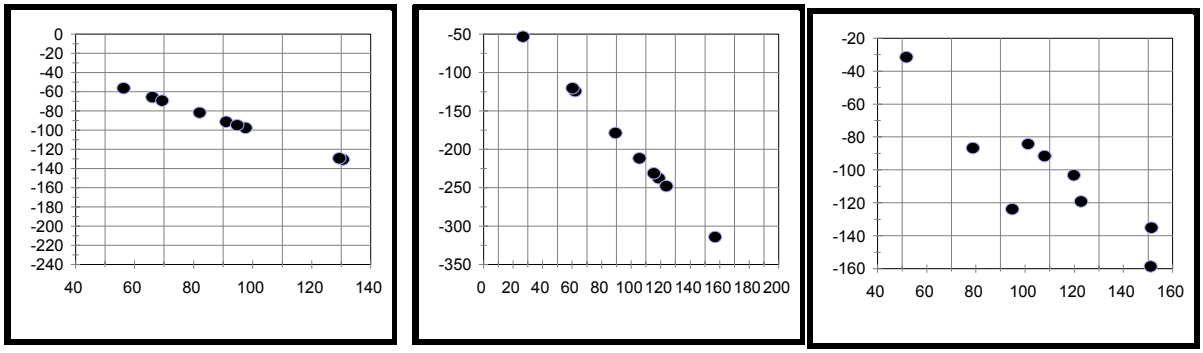


(3 points; 2 minutes)

2. **Assign the three sample correlation coefficients to the three pictures. A correlation value may be used more than once or not at all. If a picture has no appropriate correlation available, write NONE [do not put zero].**

Values
0.90
-1.00
-2.00
NONE

r = _____ **r =** _____ **r =** _____

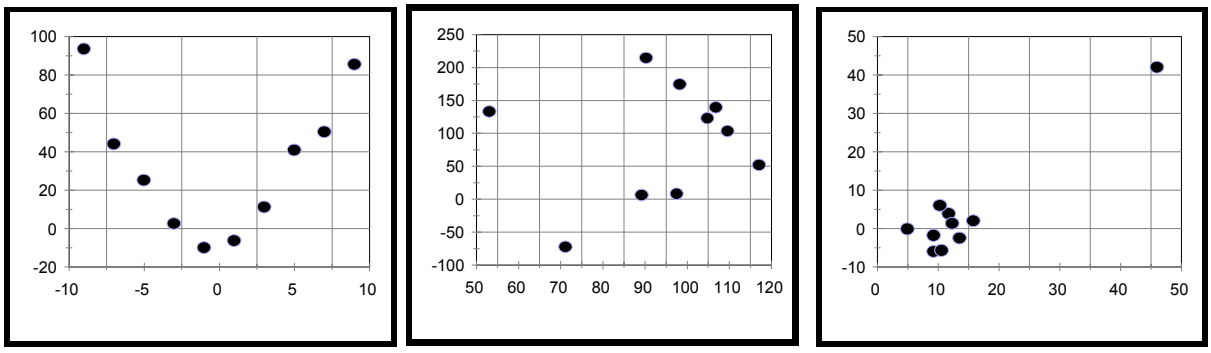


(3 points; 2 minutes)

3. **Assign the three sample correlation coefficients to the three pictures. A correlation value may be used more than once or not at all. If a picture has no appropriate correlation available, write NONE [do not use the zero].**

Values
0.00
-0.80
0.90
NONE

r = _____ **r =** _____ **r =** _____



Statistics 300
Quiz #17 **Name:** _____

(7 points; 8 minutes)

2. **Market research concerning spending patterns found a sample correlation of 0.66 between X=purchase price of house and Y=purchase price of automobile for a sample of 6 families. Use these results to test the claim that the prices paid for houses and cars are positively correlated for the population of all families.**
(Use a 0.05 significance level for this test.)

Claim: _____

H_0: _____

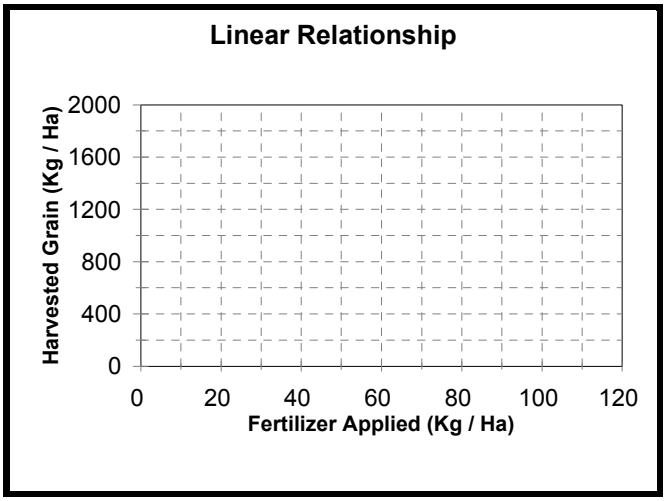
H_1: _____

Statistics 300
Quiz #17 **Name:** _____

(15 points - 16 minutes)

3. Use the data given below to answer questions (a) through (i).

Test Area	(X) Fertilizer Applied (Kg / Ha)	(Y) Harvested Grain (Kg / Ha)
1	0	429
2	10	859
3	40	1572
4	80	1756
5	120	1256



(a) Plot the data on the coordinate axes.

(b) What is the equation of the least squares regression line for these data : _____

(c) Plot the line on the graph.

(d) If a farmer used 30 Kg of fertilizer per hectare, how much grain should be expected? _____

(e) What is the linear correlation between fertilizer applied and grain harvested? _____

(f) What is the expression for "total variation in Y" (amounts of grain harvested)? _____

(g) What is the value of the total variation in Y, the amounts of grain harvested? _____

(h) What fraction of the total variation in Y is explained by the regression line? _____

(i) What is the expression for "explained variation in Y ?" _____

(j) What is the value of the explained variation in Y? _____

(k) What is the expression for "unexplained variation in Y ?" _____

(l) What is the value of the unexplained variation in Y? _____

(m) What is the expression for standard error of estimate, S_e? _____

(n) Determine the value of the standard error of estimate, S_e? _____

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Statistics 300
Quiz #18 **Name:** _____

(8 points - 20 minutes : it's a big table)

1. **Use the data in the contingency table to test the claim that customers at coffee vendors A, B, C, and D choose types of coffee beverages in the same proportions.** (Use α = 0.025 for this test)

Coffee Choice	Vendor A	Vendor B	Vendor C	Vendor D	Total
Plain	115	123	138	128	504
Latte	55	53	73	58	239
Mocha	80	74	39	64	257
Total	250	250	250	250	1000

Claim: _____

_____

H_0: _____

_____

H_1: _____

_____

Statistics 300
Quiz #18 **Name:** _____

(8 points - 10 minutes)

2. **Use the data for a random sample of claims against auto insurance in Your City to test the claim that losses due to various causes occur in Your City in the same proportions that they occur in cities throughout the nation.** (Use a Type I error rate of 0.05 for this test)

Type of Insurance Claim	Sample From Your City	National City Proportions
Theft	142	10%
Vandalism	78	9%
Fire	31	3%
Flood/Storm	10	2%
Collision	739	76%
Total	1000	100%

Claim: _____

H_0: _____

H_1: _____

Statistics 300
Quiz #19 **Name:** _____

(8 points : 10 minutes)

1. **Use the data below to complete the Analysis of Variance Table and test the claim that all of the 1998 Chevy Nova cars have the same gas mileage today.** (Use a 0.05 significance level for the test.)

Car	Test 1	2	3	4	Sample Size	Mean	Standard Deviation
Car 1	20.33		20.63	17.00	3	19.32	2.015
Car 2	19.93	20.06	17.52		3	19.17	1.430
Car 3	17.53	18.50	17.10	20.87	4	18.50	1.685
Car 4	19.54	17.81	20.81	17.91	4	19.02	1.434
Car 5	20.39	20.33	18.56		3	19.76	1.040
Car 6	19.14	17.29	17.01	20.04	4	18.37	1.460
Car 7	19.77	20.60	19.08	19.96	4	19.85	0.626
Car 8	17.85	17.72	18.45		3	18.01	0.389
Car 9	19.10	17.09	17.45		3	17.88	1.072

	Overall		Pooled
Total N	**Mean**	**St. Dev.**	**St. Dev.**
31	**18.88**	**1.331**	**1.335**

Analysis of Variance Table

Source	Deg. of Freedom	Sum of Squares	Mean Square	F
Cars				
Error				
Total				

Statistics 300
Quiz #19 **Name:** _____

(8 points : 10 minutes)

2. **Use the information below to test the claim that all of the 1998 Chevy Nova cars tested have the same gas mileage today.**
(Use a 0.10 significance level for the test.)

	Test		
Car	**1**	**2**	**3**
Car 1	20.33	17.00	20.63
Car 2	19.93	20.06	17.52
Car 3	17.53	18.50	17.10
Car 4	19.54	17.81	20.81
Car 5	20.39	20.33	18.56
Car 6	19.14	17.29	17.01
Car 7	19.77	20.60	19.08
Car 8	17.85	17.72	18.45
Car 9	19.10	17.09	17.45

Analysis of Variance:One Way

Summary

Groups	***Count***	***Sum***	***Average***	***Variance***
Car 1	3	57.96	19.32	4.0593
Car 2	3	57.51	19.17	2.0461
Car 3	3	53.13	17.71	0.5143
Car 4	3	58.16	19.387	2.267633
Car 5	3	59.28	19.76	1.0809
Car 6	3	53.44	17.813	1.339633
Car 7	3	59.45	19.817	0.579233
Car 8	3	54.02	18.007	0.151633
Car 9	3	53.64	17.88	1.1487

Analysis of Variance Table

Source of Variation	***SS***	***df***	***MS***	***F***	***P-value***
Between Groups			2.3743		0.187788
Within Groups					
Total	45.369				