Statistics 300
Quiz #8 **Name:** ______________________

(4 points)
1. Shade in the area that corresponds to the probability statement, then determine the probability (picture is worth 2 points).

X ~ U[10,20]

What is the probability that a random X will be between 16 and 19?

$P(16<X<19) =$ ______________

(5 points)
2. Shade in the area that corresponds to the probability statement, then determine the probability (picture is worth 2 points).

The random variable "X" is governed by the Uniform distribution on the interval [1,2].

What is the probability that a random X will be between 0.65 and 1.35 (not a typo)?

$P(0.65 < X < 1.35) =$ ______________

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Name: ______________________________

(5 points)
3. Shade in the area that corresponds to the probability statement, then determine the probability (picture is worth 2 points).

X ~ N(m=0, s=1)

What is the probability that a random X will be between - 0.44 and 1.83?

P(- 0.44 < x < 1.83) = ______________

(5 points)
4. Shade in the area that corresponds to the probability statement, then determine the probability (picture is worth 2 points).

(c). X ~ N(m=100, s=13)

What is the probability that a random X will be less than 118?

P(x < 118) = ______________
(x less than 118)

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Quiz #8 **Name:** ____________________

(6 points)

5. If the random variable X is distributed according to a normal distribution with mean (m) equal to 83 a
standard deviation (s) equal to 14, what is the 29th percentile (P_{29}) for the population?

(Picture is worth 2 points.)

(5 points)

6. If the random variable X is distributed according to the standard normal distribution (m = 0 and s = 1)
what is the 70th percentile (P_{70}) for X ?

(Picture is worth 2 points.)

Statistics 300

Quiz #9 **Name:** ________________________

(6 points : 10 minutes)

1. **Complete the following table.**

	m	s	n	$m_{\bar{x}}$	$s_{\bar{x}}$
(a)	216	27	81		
(b)	200	27	9		
(c)			81	216	3
(d)			9	200	9
(e)	88	27			3
(f)	1023	27			9
(g)		43	15	500	
	the population mean	**the population standard deviation**	**the sample size**	**the mean of all possible sample means**	**the standard deviation of all possible sample means**

(6 points : 10 minutes)

2. **Construction workers (in the old days) would light a length of "fuse" on fire which would burn toward dynamite and explode it. For fuses cut to ten meters in length, the times between lighting the fuses and the subsequent explosions average 3.5 minutes with a standard deviation of 0.25 minutes (for fuse material from the old supplier).**

   Fuse material from a new supplier arrives at your construction site. To test the behavior of this material, you randomly select 50 sections, each 10 meters long and record how long they burn. For your sample, the mean burn time is 3.16 minutes with a sample standard deviation of 0.48 minutes.

   Use the sample results to construct a 95% confidence interval for the true mean burn time of all possible 10 meter lengths of your fuse material.

   Based on your confidence interval, is it reasonable for the new supplier of fuse material to claim that the mean burn time of their material is the same the mean burn time for material from the old supplier?

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Quiz #9 **Name:** ______________________________

(8 points : 15 minutes)

3. **A geologist is searching for mineral deposits that are rich enough to be mined profitably. One area is especially promising, because the average mineral content is 380 grams of mineral for every cubic meter of earth. The standard deviation of the mineral content per cubic meter is 96 grams.**

   Of course, the mining company does not know the "truth" about the mineral content of the area. The company will take samples and will start mining operations if the average mineral content in the samples is greater than 350 grams. If 49 samples of earth (each one cubic meter) are randomly selected, what is the probability that the company will begin mining operations?

4. **The random variable "X" has a distribution with a mean of 62.34 and a standard deviation of 16.77. Consider the distribution of all possible sample means from samples of size 8. Determine the 59th percentile of this sampling distribution.**
   (Hint: You have not seen this type of problem in class or in the textbook. Work from what you) know to what you do not know. Finally, solve for the requested percentile of the "sampling distribution, not the original distribution of "X".)

Statistics 300
Quiz #10 **Name:** ____________________________

In these problems, you must provide the symbolic formula and the formula with the relevant values in place.

(8 points)
1. A survey of Sacramento Area households found that 285 had a dog (one or more) and 595 did not. Use these results to prepare a 95% confidence interval for the proportion of all households in the Sacramento Area that have a dog.

Does the interval you prepared above make it reasonable to claim that 2 out of every 5 households in the Sacramento Area have a dog?

Yes **No** **Why?** ____________________________

____

____

(6 points)
2. The Board of Supervisors for Sacramento County wants to know the proportion of all households In the area that have a dog (one or more). If they want to be 90% certain that the difference between the proportion in their sample and the proportion for the whole county is not more than 0.05, how many households must they sample at random? In 1950, it was estimated that 60% of Sacramento area households had a dog, but some suggest that the proportion to day is smaller.

Statistics 300
Quiz #10

Name: ______________________

$X \sim N(\mu = 80,\ \sigma = 12)$

What is the probability that the average for a random sample of 18 values will be between 76 and 85?

$$P(76 < \bar{x} < 85) = \underline{\hspace{4cm}}$$

$X \sim N(\mu = 100,\ \sigma = 13)$

What is the 15th percentile of the population of all possible sample means from samples of size = 10?

P_{15} = ______________________

Statistics 300
Quiz #11 **Name:** ______________________________

In these problems, you must provide the symbolic formula and the formula with the relevant values in place.

(8 points)

1. The average fat content of hamburgers at fast-food restaurants was studied by collecting a random sample of 9 hamburgers and determining the amount of fat in each one. Use the data from the study shown in the box below to make a 90% confidence interval for the mean fat content of the population of all hamburgers at fast-food restaurants. Experience shows that this population is bell-shaped.

Burger	Fat * Content
1	27.5
2	25.6
3	26.4
4	25.7
5	36.3
6	31.6
7	30.4
8	28.9
9	29.1

* in grams

(7 points)

2. The average fat content of hamburgers at fast-food restaurants is being studied by collecting a random sample of hamburgers and determining the amount of fat in each one. Ten hamburgers have already been tested and the variance of the fat contents was 576 g^2. If the goal of this this research is to estimate the mean of the population of the fat contents of all hamburgers at fast-food restaurants with an accuracy of plus or minus 0.5 grams with 95% confidence, how many more hamburgers must be tested?

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Quiz #11 **Name:** ________________________________

(8 points)
3. A random sample of 32 hamburgers from fast-food restaurants was collected and the fat content of each was determined. The sample average was 28.6 grams and the sample standard deviation was 5.92 grams. Use these results to construct a 90% confidence interval for the standard deviation of the population of the fat contents of all hamburgers from fast-food restaurants. (As you already know, the distribution fat contents is approximately bell-shaped.)

Based on your confidence interval, is it reasonable to claim that the population standard deviation (s) is less than 6 grams?

Yes **No** **Why?** ____

____

____

Based on your confidence interval, is it reasonable to claim that the population standard deviation (s) is more than 6 grams?

Yes **No** **Why?** ____

____

____

Statistics 300
Quiz #12 **Name:** ____________________

For hypothesis test problems, you must provide all four parts of the traditional approach.
The test statistic must show the symbolic formula and the formula with relevant values in place.

(8 points : 8 minutes)

1. A group of 257 randomly selected adults began a diet and exercise program with the goal of losing 20 pounds each in 80 days. At the end of the 80 days, 76% had lost 20 pounds or more Use these results to test the program creator's claim that 80% of adults who choose to work the program will lose 20 pounds or more in 80 days. (Use a 4% significance level for this test.)

Claim: ____________________

H_0: ____________________

H_1: ____________________

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Quiz #12 **Name:** ______________________

(8 points : 10 minutes)

2. Based on "focus group" data (small samples not randomly selected), an advertizer claims that at least 70% of television viewers who see their beer commercials think the brand of beer is good. Test the advertizer's claim using the data from a random sample shown below.
(Let α = 0.025 for this test.)

Data from Random Sample

	Opinion of Beer	
	Good	**Not Good**
Saw Beer Ad	**228**	**74**
Did not See Ad.	**305**	**199**

Claim: ______________________

H_0: ______________________

H_1: ______________________

Statistics 300
Quiz #13 **Name:** ______________________________

For hypothesis test problems, you must provide all four parts of the traditional approach.
The test statistic must show the symbolic formula and the formula with relevant values in place.

(8 points : 8 minutes)

1. A group of 25 men with the same high cholesterol level participated in a clinical test of a new medication to lower cholesterol levels in blood. Use the data below to test the claim that the new medication will decrease cholesterol by at least 10 points on average for the population of all men who have similar high cholesterol levels. (Use $\alpha = 0.05$ and assume that the distribution of decreases in cholesterol is bell-shaped.)

Claim: ______________________

H_0: ______________________

H_1: ______________________

Decreases in Cholesterol

$n = 25$
$\bar{x} = 8.34$
$s = 12.11$

Statistics 300
Quiz #13 **Name:** ______________________________

(8 points : 10 minutes)

2. A manufacturing company must produce 10,000 items of the same kind so they are very similar to each other. The width of all 10,000 items must average between 1000 and 1004 with a standard deviation of 2 or less. Use the data on a sample of the first 51 items to test the production manager's claim that the goal for variability is being satisfied.
(Consider the sample to be "random" and make the significance level 0.10 for your test.)

Claim: ______________________

H_0: ______________________

H_1: ______________________

Data on widths

$n =$ 51

$\bar{x} =$ 1003.4

$s =$ 2.12

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 (m_1 - m_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**