

Exam #2

(8 points; 8 minutes)

1. A sample of 27 rocks was collected at random on the surface of the planet Mars. The iron content of the rocks had an average of 2.6 g/kg and a standard deviation of 1.9 g/Kg. Use this information to make a 90% confidence interval for the average iron content of all the rocks on the surface of Mars.

Based on your confidence interval, is it reasonable to claim that iron can be found in rocks on Mars?

YES NO Why? _____

(8 points; 9 minutes)

2. Some people think that downwind of a power plant that uses old tires for fuel there will be high levels of pollutants in the plants that are eaten by dairy cows. Variation in the measurements of pollutants in plant material makes it hard to know whether these concerns are appropriate. Use the data below to make a 90% confidence interval for the standard deviation of Dioxin in plant material downwind of a power plant that burns old tires. Assume the values represent a random sample, and that the population of Dioxin levels is bell-shaped.

Sample	Units of Dioxin*
1	16.6
2	17.9
3	6.6
4	3.2
5	19.0
6	24.3

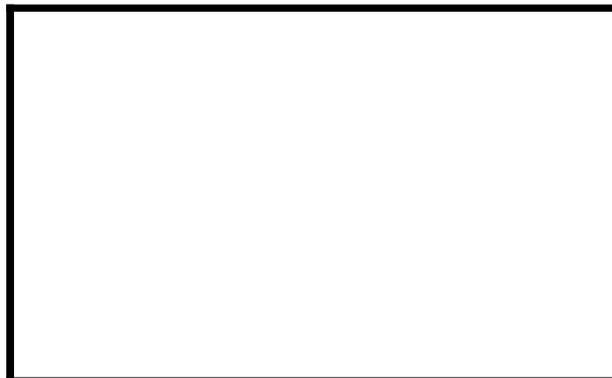
* unspecified units

Based on your confidence interval, is it reasonable to claim that the power plant makes Dioxin in the plants too high? (A standard set for Dioxin in the environment is 4.2 units.)

YES NO Why? _____

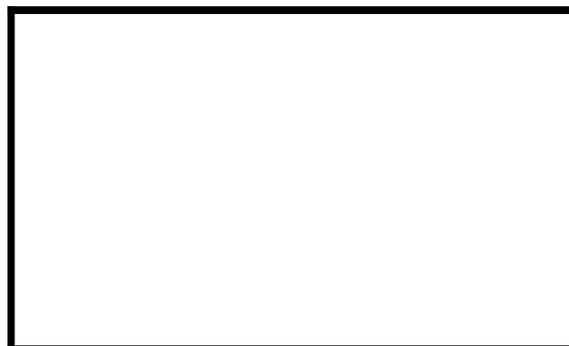
(7 points; 7 minutes)

3. The weights of people follow a Normal distribution with a mean of 65 Kg and a standard deviation of 18 Kg. What is the probability that a random sample of 22 people will have an average weight less than 70 Kg ? The required picture is worth 2 of the 7 points.



(8 points; 8 minutes)

4. (a) For the uniform distribution between 113 and 396, what is the probability that a random value will be greater than 191 and less than 377 ? (The picture is required and is worth 2 points.)



- (b) What is the probability that two random values from this uniform distribution will both be between 191 and 377 ?

(5 points; 5 minutes)

5. What is the 34th percentile (P_{34}) of the uniform distribution on the interval [1109, 3755] ?

The picture is required and is worth 2 points.



(6 points; 6 minutes)

6. NASA (National Aeronautics and Space Administration) is thinking of going to the Moon again.

One goal of the trip would be to estimate the average amount of Lithium in the rocks on the Moon. On Earth, the standard deviation of Lithium per kg of rock is about 0.45 milligrams. If NASA wants to have 98% confidence that the amount of Lithium per Kg of Moon rocks in their sample will be within 0.1 milligrams of the true mean Lithium content per Kg of all Moon rocks, how many Moon rocks should NASA plan to study?

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7. The Department of Fish and Game monitors the health of fish populations in the Pacific Ocean. In the past, the variability (sigma) of salmon weights has been 2.37 pounds. Recently, a sample (consider it to be effectively "random") of 41 salmon had the statistics given in the box below. Use this information to test the claim that the variability of salmon weights is now at least 0.5 pounds more than it was "in the past". (Use a 5% significance level for this test.)

Statistics for Salmon Sample	
n =	41
\bar{x} =	7.72 pounds
s =	2.88 pounds

H_0 : _____

H_1 : _____

8. NASA (National Aeronautics and Space Administration) is thinking of going to the Moon again. One goal of the trip would be to estimate the amounts of minerals such as Lithium in the rocks on the Moon. On Earth, 15% of all rocks have measurable amounts of Lithium. If NASA wants to have 95% confidence that the proportion of Moon rocks with measurable Lithium in their sample will be within 3 percentage points of the true proportion of all Moon rocks containing measurable amounts of Lithium, how many Moon rocks should NASA plan to study?

(8 points; 8 minutes)

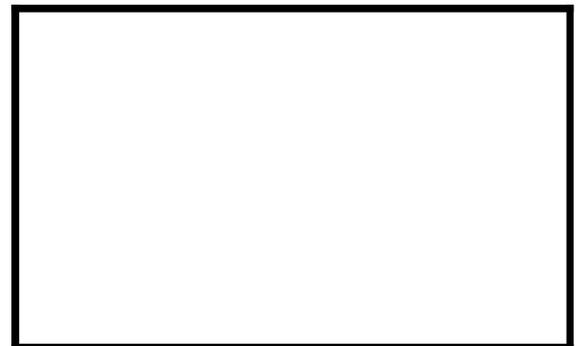
9. A random sample of rocks from the surface of Earth's Moon found that 43 had measurable amounts of Lithium in them and 198 did not. On Earth, 15% of the rocks have measurable amounts of lithium in them. Use the data for the Moon rocks to test the claim that the proportion of Moon rocks that contain Lithium is greater than the proportion of Earth rocks that contain Lithium. Use $\alpha = 3\%$ for the significance level of this test.

H_0 : _____

H_1 : _____

(5 points; 4 minutes)

10. If $X \sim N(\mu = 85.3, \sigma = 12.88)$, what is the probability that a random value of X will be greater than 90.2? (The picture is required and is worth 2 points.)



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11. For the Normal distribution with mean = 835 and standard deviation = 66, what is the value that separates the lower 67% of the distribution from the upper 33% ?

The picture is required and is worth 2 points.



(7 points; 7 minutes)

12. Use the data given here for a random sample of Basketball fans to make an 82% confidence interval for the proportion of all basketball fans in Arizona whose favorite team is the Sacramento Kings.

Favorite Basketball Team	Home State			Total
	AZ	CA	WA	
Phoenix Suns	140	60	30	230
Sacramento Kings	40	270	10	320
Seattle Sonics	20	70	160	250
Total	200	400	200	800

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(9 points; 10 minutes)

13. The Department of Fish and Game monitors the health of fish populations in the Pacific Ocean. A random sample of 5 tuna were captured and weighed. Use the data given here to test the claim that the mean weight of all tuna is less this year than it was last year, when records show that the average weight was 70.4 pounds. Use a “Type I Error Rate” of 0.025.

Weights* of Tuna	
Fish #	Weight
1	83.5
2	68.5
3	58.6
4	84.0
5	43.4

* weights in pounds