Decision Making with Data

Started on	Tuesday, June 2, 2020, 8:32 PM
State	Finished
Completed on	Tuesday, June 2, 2020, 8:36 PM
Time taken	4 mins 31 secs
Grade	**100** out of 100

Question 1

Correct
10 points out of 10

Question text

You are studying the viscosity of a polymer. You collect viscosity measurements on a random sample of 30 batches. You want to predict the viscosity for the next 5 batches produced. Which statistical method would you use?
Select one:

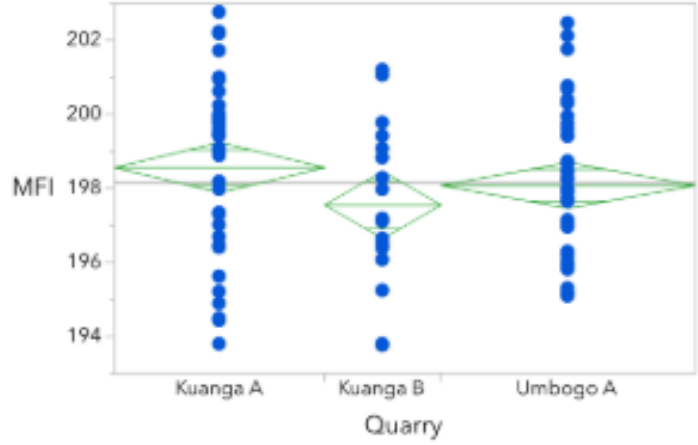
- a. You would calculate a prediction interval.
- b. You would perform a one-sample *t* test.
- c. You would calculate a confidence interval.
- d. You would calculate a tolerance interval.

Question 2

Correct
10 points out of 10

Question text

You conduct a test to determine whether there is a significant difference in the mean melt flow index (MFI) for three quarries. Using a significance level of 0.05, what can you conclude from this analysis?



Oneway Anova

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Quarry	2	14.17209	7.08604	1.6052	0.2059
Error	102	450.27502	4.41446		
C. Total	104	464.44710			

Means for Oneway Anova

Level	Number	Mean	Std Error	Lower 95%	Upper 95%
Kuanga A	38	198.561	0.34084	197.88	199.24
Kuanga B	21	197.551	0.45849	196.64	198.46
Umbogo A	46	198.079	0.30978	197.46	198.69

Std Error uses a pooled estimate of error variance

Excluded Rows 5

Select one:

a. The average MFI for the three quarries is the same.

b. There are no significant differences in the average MFI for the three quarries.

c. The average MFI for Kuanga B is significantly lower than the average MFI for Kuanga A.

d. There are significant differences in the average MFI for the three quarries.

Question 3

Correct

10 points out of 10

Question text

You want to conduct a test to determine whether there are significant differences in the mean impurity levels for polymers produced with three different catalysts. Which statistical test is appropriate for this scenario?

Select one:

a. two-sample *t* test

b. one-sample *t* test

c. one-way ANOVA

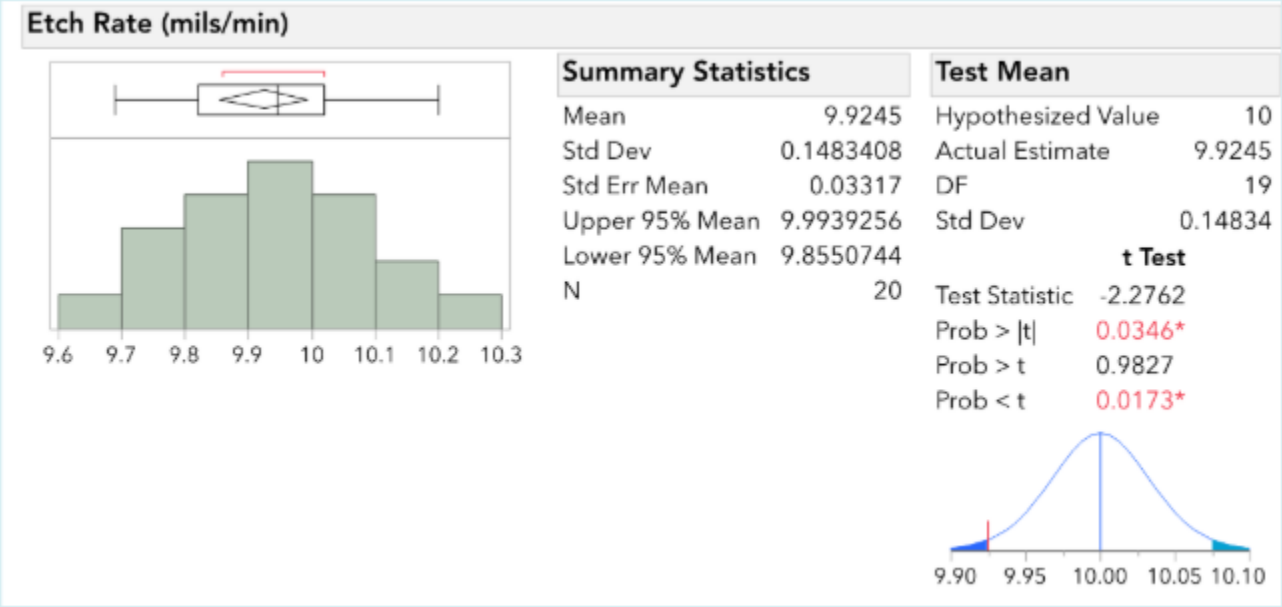
d. paired *t* test

Question 4

Correct
10 points out of 10

Question text

The target etch rate for a wet etching process is 10 mils/min. You measure a random sample of 20 wafers and conduct a hypothesis test to determine whether the process is off target. You use a significance level of 0.05. What can you conclude from the following output?



Select one:

a. There is not enough information to make a decision about whether the process is off target.

b. The 95% confidence interval for the mean includes 10, so the process is on target.

c. The mean is 9.92 and the standard deviation is 0.148, so the process is off target.

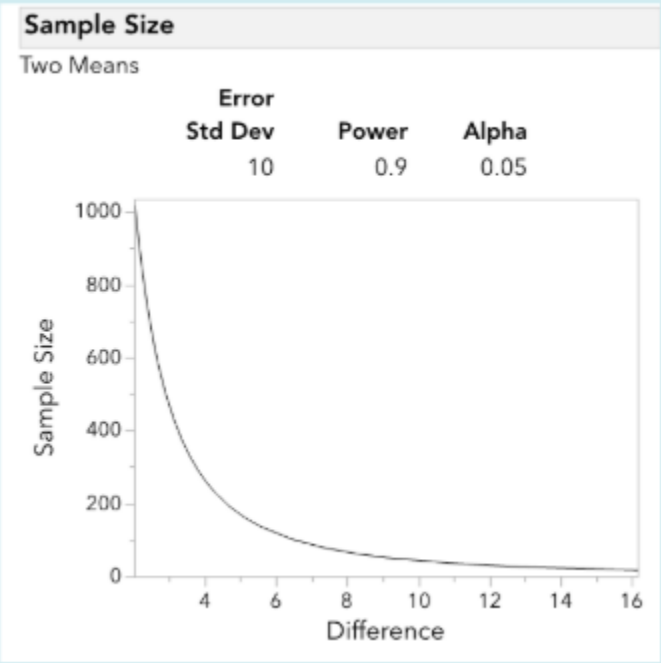
d. The two-tailed test is significant, with a *p*-value of 0.0346, so the process is off target.

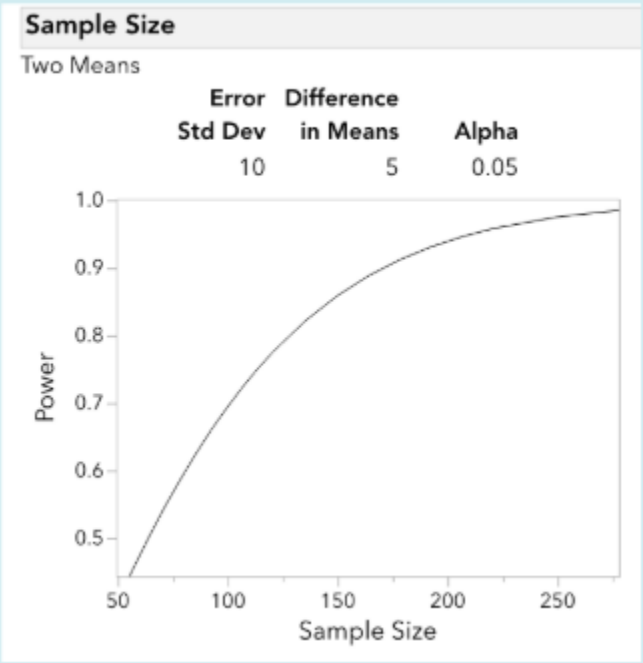
Question 5

Correct
10 points out of 10

Question text

You are studying the breaking strength of two types of plastic. You will use the plastic with the highest breaking strength. A difference of 5 psi (pounds per square inch) or more would be considered important for your application. You analyze the sample size required to detect this difference, using a power of 0.9, an estimated standard deviation of 10, and a significance level of 0.05. Using the output provided below, which of the following statements is true?





Select one:

a. If you increase power from 0.9 to 0.95, you will need less data in order to detect a difference of 5 psi.

b. As the sample size increases, the power of the test decreases.

c. If you increase the difference that you need to detect from 5 psi to 10 psi, you will need more data to detect this difference.

d. As the sample size increases, the power of the test increases.

Question 6

Correct
10 points out of 10

Question text

In an election poll, 48% of likely voters are in favor of Candidate A, and 52% are in favor of Candidate B. The margin of error for each candidate is +/- 3%, and the confidence level is 95%. Which of the following statements is true?
Select one:

a. With 95% confidence, the true proportion of likely voters who support Candidate B is between 0.49 and 0.55.

b. The probability that 52% of the population votes for Candidate B is 95%.

c. Candidate B will win the election by a margin of 3%.

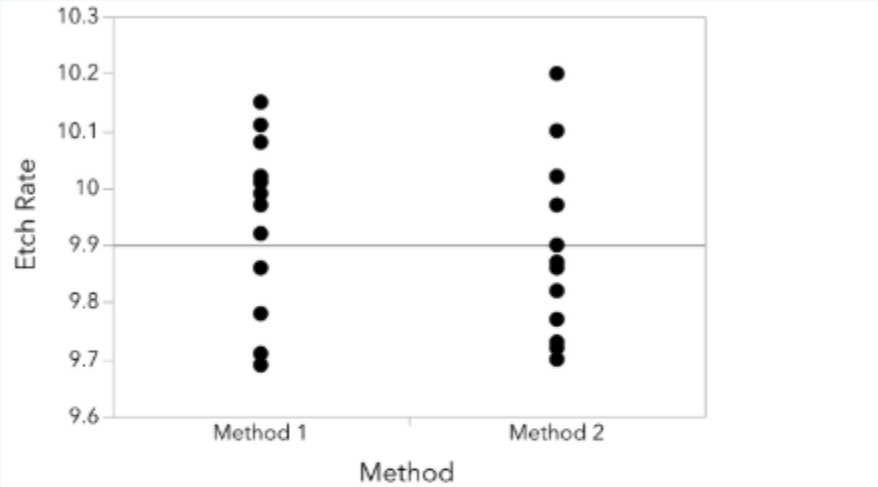
d. In the election, 48% of likely voters will vote for Candidate A, and 52% will vote for Candidate B.

Question 7

Correct
10 points out of 10

Question text

You want to compare the etch rate for wafers produced using two different etching methods. For each method, the etch rate for 15 wafers is measured. You conduct a two-sample *t* test to determine whether there is a significant difference in the average etch rate for the two methods. You use a significance level of 0.05. Based on these results, which of the following statements is true?

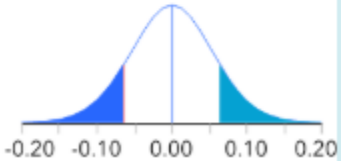


t Test

Method 2-Method 1

Assuming unequal variances

Difference	-0.06467	t Ratio	-1.18943
Std Err Dif	0.05437	DF	27.99505
Upper CL Dif	0.04670	Prob > |t|	0.2443
Lower CL Dif	-0.17604	Prob > t	0.8779
Confidence	0.95	Prob < t	0.1221



Select one:

a. This is the incorrect analysis. A paired *t* test should have been conducted instead.

b. The difference between the means for the two methods is statistically significant.

c. The difference between the means for the two methods is not statistically significant.

d. The mean for Method 1 is 0.0647 units lower than the mean for Method 2.

Question 8

Correct

10 points out of 10

Question text

A patient, who is complaining of chest pains, is tested for a heart attack. The null hypothesis is that the patient did not have the heart attack. Match the decision outcome to the correct description.

false positive (Type I error)	Answer 1: The test is positive for the heart attack, but the patient did not have a heart attack.
true positive	Answer 2: The test is positive for the heart attack, and the patient did have a heart attack.
true negative	Answer 3: The test is negative for the heart attack, and the patient did not have a heart attack.
false negative (Type II error)	Answer 4: The test is negative for the heart attack, but the patient did have a heart attack.

Question 9

Correct

10 points out of 10

Question text

The target for a process is 30 mm. You replaced a vital piece of equipment and must ensure that the process is still on target. If the process mean is within 1 mm of the target, the process performance is considered acceptable. Which statistical test would you conduct to determine whether the performance is acceptable?

Select one:

- a. paired *t* test
- b. one-sample *t* test
- c. two-sample *t* test
- d. equivalence test

Question **10**

Correct

10 points out of 10

Question text

You have the following tolerance interval. What is the correct interpretation of this interval?

Select one:

- a. You are 90% certain that at least 95% of the population values will fall between 1.14 and 3.03.
- b. You are 95% certain that the probability is 0.90 that your mean is between 1.14 and 3.03.
- c. You are 95% certain that at least 90% of the population values will fall between 1.14 and 3.03.
- d. You are 90% certain that 95% of your sample values will fall between 1.14 and 3.03.

Finish review