

Valencia College
 Division of Engineering, Computer Programming and Technology
 EGN 2440 Probability and Statistics for Engineers
 Spring 2015
 Instructor: Kwabena Oforu, Ph.D., P.E.

Name: _____

Quiz 7

Six small manufacturers in Central Florida qualified for a special credit remediation plan where their management personnel were required to take some financial management classes, as well as technical classes to help improve productivity and quality of their products. Their credit ratings before and 1 year after the program are as follows;

Manufacturer	(X_1) Credit rating before	(X_2) Credit rating after
J.C. Inc	620	654
P&B Co.	650	655
Dave & Sons	643	650
GWH Products	630	703
Myers Chemicals	637	689
JV Engineering	644	644
Beau Jones Inc	701	710
MMG Partners	648	639
Kent LLC	627	642
Brent Murphy LLC	622	655
Nando and Vargas	650	701
FP Concrete	628	625

Using my calculator

$$\bar{X}_1 = 641.66$$

$$S_1 = 21.58$$

$$\bar{X}_2 = 663.91$$

$$S_2 = 28.79$$

Conduct a hypothesis test at 95% confidence, to test whether the mean credit rating before the program, and that after the program are the same, or not. [Hint: hypothesis test of two means, or you may use Matched Pair Comparison](8 points)

$$H_0: \mu_1 - \mu_2 = 0$$

$$H_a: \mu_1 - \mu_2 \neq 0$$

$$\alpha = 0.05$$

Can use

- critical values
- p-value
- confidence interval

Let's use critical values

$$t_{calc} = \frac{(\bar{X}_1 - \bar{X}_2) - \delta_0}{\sqrt{\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2}}}$$

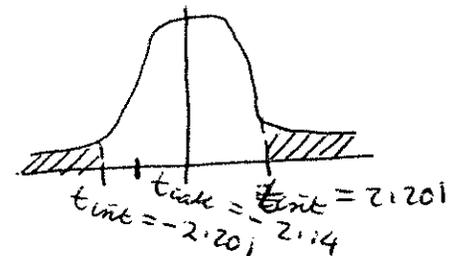
$$= \frac{(641.66 - 663.91) - 0}{\sqrt{\frac{21.58^2}{12} + \frac{28.79^2}{12}}}$$

$$= -2.14$$

$$t_{crit} = t_{\alpha/2, v} = t_{0.025, v = \min(n_1-1, n_2-1)}$$

$$= t_{0.025, v=11} \xrightarrow{\text{table}}$$

$$= 2.201$$



Fail to reject H_0 !

Would you say there is sufficient evidence that the credit remediation plan is effective in improving the credit standing of the companies (assuming all other factors remain the same)? (2 points)

Fail to reject H_0 means 'before' sample and 'after' sample behave the same. This is insufficient evidence that the plan is effective in improving credit scores.

Matched Pair Comparison. Note that you may get a different result than using a regular 2-sample Hypothesis Test. This is normal.

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Small manufacturers in Central Florida qualified for a special credit remediation plan where their management personnel were required to take some financial management classes, as well as technical classes to help improve productivity and quality of their products. Their credit ratings before and 1 year after the program are as follows;

Manufacturer	X_1 Credit rating before	X_2 Credit rating after	$D = X_2 - X_1$
J.C. Inc	620	654	34
P&B Co.	650	655	5
Dave & Sons	643	650	7
GWH Products	630	703	73
Myers Chemicals	637	689	52
JV Engineering	644	644	0
Beau Jones Inc	701	710	9
MMG Partners	648	639	-9
Kent LLC	627	642	15
Brent Murphy LLC	622	655	33
Nando and Vargas	650	701	51
FP Concrete	628	625	-3

$\bar{D} = 22.25$
 $S_D = 25.95$

Conduct a hypothesis test at 95% confidence, to test whether the mean credit rating before the program, and that after the program are the same, or not. [Hint: hypothesis test of two means, or you may use Matched Pair Comparison](8 points)

$H_0: \mu_D = 0$

$H_a: \mu_D \neq 0$

$\alpha = 0.05$

Can use

- critical values
- p-values
- confidence interval

Let's use confidence interval

$$CI = \bar{D} \pm t_{\frac{\alpha}{2}, v} \frac{S_D}{\sqrt{n}}$$

$v = n - 1$

$t_{\frac{\alpha}{2}, v} = t_{0.025, 11} \xrightarrow{\text{table}} 2.201$

$$CI = 22.25 \pm 2.201 \frac{25.95}{\sqrt{12}}$$

$$= 22.25 \pm 16.49$$

$$= [5.76, 38.74]$$

Since $\mu_D \notin CI$
 we ~~fail to~~ reject H_0 !
 Credit ratings before and after are not the same

Would you say there is sufficient evidence that the credit remediation plan is effective in improving the credit standing of the companies (assuming all other factors remain the same)? (2 points)

Credit rating before and after are different based on our test, so we have evidence that the plan is effective.