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Monday, September 13, 2021 7:54 AM

Section 1

MANE 6313

Subsection 1

Week 3, Module B

Student Learning Outcome

Analyze simple comparative experiments and experiments with a single factor.

Module Learning Outcome

Analyze a sample problem using Minitab's One-Way Analysis of Variance command.

One-Way Analysis of Variance

16. In the article "Polymer Composite Matrices for Maintenance-Free Highly Durable Ferrocement" (*J. Ferrocement,* 1984: 337–345), four types of mortars—ordinary cement mortar (OCM), polymer impregnated mortar (PIM), resin mortar (RM), and polymer cement mortar (PCM)—were subjected to compression tests to determine their strengths (in MPa). Three samples of each type of mortar were tested, resulting in the following data:

OCM	32.15	35.53	34.20
PIM	126.32	126.80	134.79
RM	117.91	115.02	114.58
PCM	29.09	30.87	29.80

a = 4
n = 3

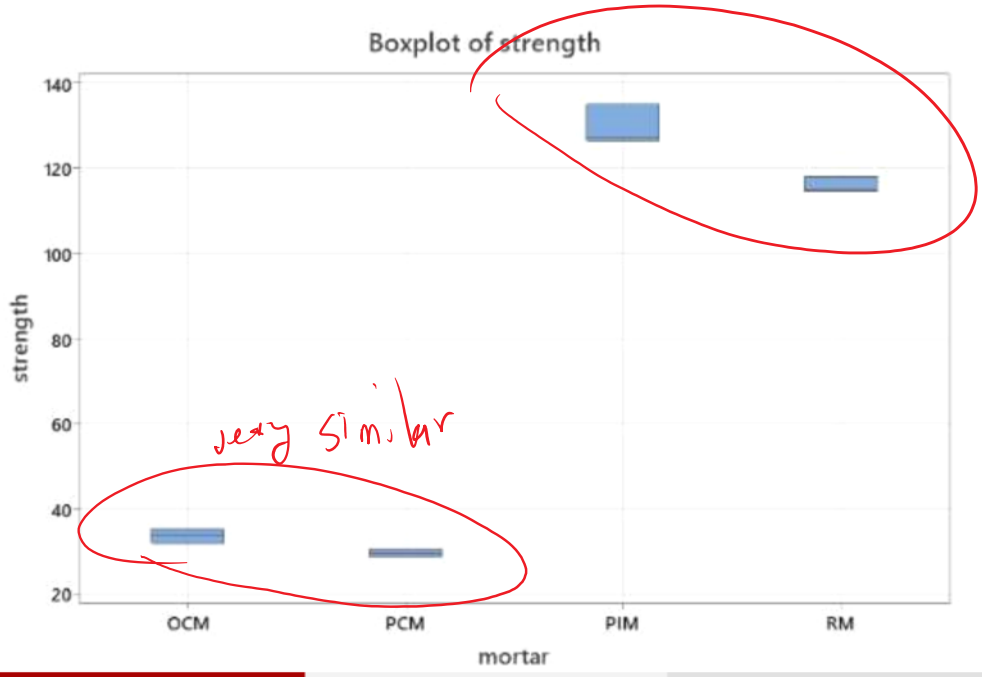
Anova

Source	d.f.	SS	MS
Mortar	3		
error	11-3=8		
Total	11		

a. Construct an ANOVA table for this study.

b. Using a significance level of .05, can you conclude that there is a difference between

Step 1 - Plot Data



Variance
size of rectangle
PIM has much larger variance than PCM

very similar

location

Step 2 - Analyze Problem

WORKSHEET 1

One-way ANOVA: strength versus mortar

Null hypothesis	All means are equal
Alternative hypothesis	Not all means are equal
Significance level	$\alpha = 0.05$

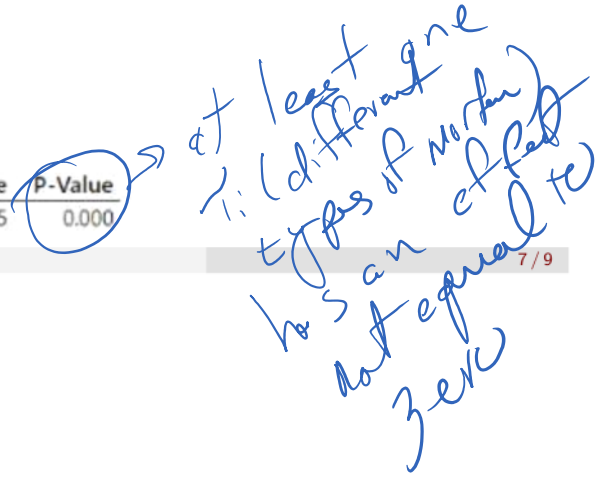
Equal variances were assumed for the analysis.

Factor Information

Factor	Levels	Values
mortar	4	OCM, PCM, PIM, RM

Analysis of Variance

Source	DF	Adj SS	Adj MS	F-Value	P-Value
mortar	3	24937.9	8312.63	1122.95	0.000



Step 2 - Analyze Problem, continued

Model Summary

S	R-sq	R-sq(adj)	R-sq(pred)
2.72075	99.76%	99.67%	99.47%

Means

mortar	N	Mean	StDev	95% CI
OCM	3	33.960	1.703	(30.338, 37.582)
PCM	3	29.920	0.896	(26.298, 33.542)
PIM	3	129.30	4.76	(125.68, 132.93)
RM	3	115.84	1.81	(112.21, 119.46)

Pooled StDev = 2.72075

Minitab Demonstration

- Box Plot
- One-way ANOVA