

# Statistical Analysis Final Project

## Description of Study

The data were exported from the gradebooks of two online introductory statistics course sections. The two sections of the course were taught by different instructors. All of the materials and assessments used in the two sections were identical.

## Dataset

[Gradebook2023.csv](#) [Download Gradebook2023.csv](#)

## Research Questions

1. Can midterm exam scores be used to predict final exam scores? (Use the data from both sections)
2. Did the average final exam scores of students in the two sections differ?

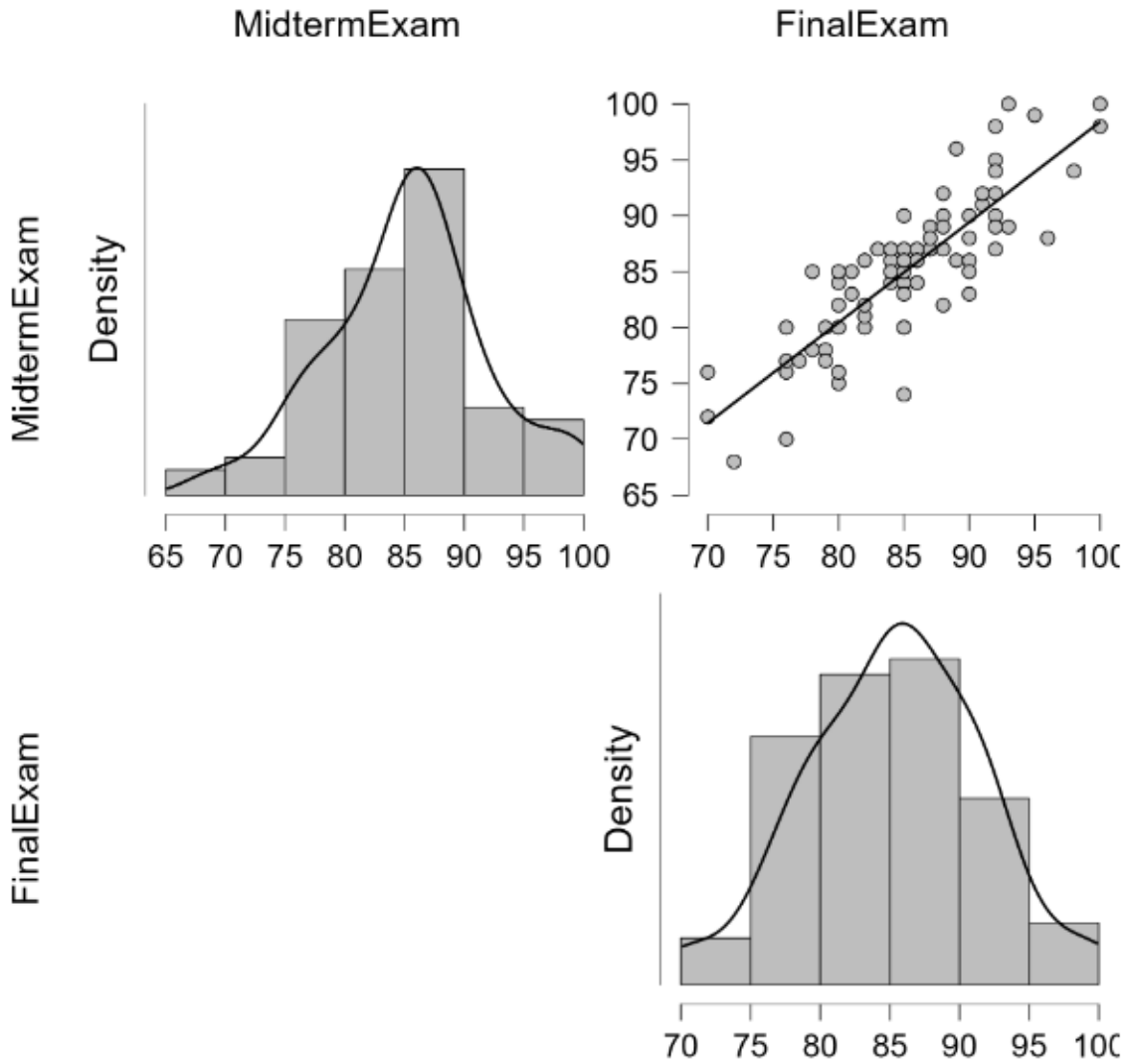
## Answers

### Descriptive Statistics-MidtermExam and FinalExam

Descriptive Statistics

	MidtermExam	FinalExam
Valid	76	76
Missing	0	0
Mean	85.250	85.355
Std. Deviation	6.755	6.362
Minimum	68.000	70.000
Maximum	100.000	100.000

**Correlation plot**



**Correlation-MidtermExam and FinalExam**

Pearson's Correlations

		n	Pearson's r	p	Lower 95% CI	Upper 95% CI	
MidtermExam	-	FinalExam	76	0.846	< .001	0.767	0.900

## Linear Regression-MidtermExam and FinalExam

Model Summary - FinalExam

Model	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	RMSE
H <sub>0</sub>	0.000	0.000	0.000	6.362
H <sub>1</sub>	0.846	0.716	0.712	3.413

ANOVA

Model		Sum of Squares	df	Mean Square	F	p
H <sub>1</sub>	Regression	2173.393	1	2173.393	186.576	< .001
	Residual	862.015	74	11.649		
	Total	3035.408	75			

Note. The intercept model is omitted, as no meaningful information can be shown.

Coefficients

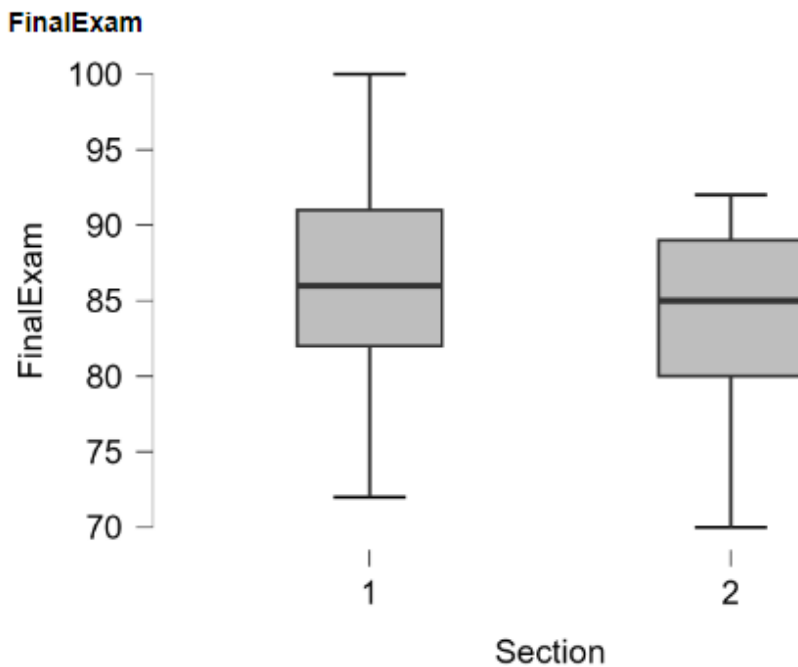
Model		Unstandardized	Standard Error	Standardized	t	p
H <sub>0</sub>	(Intercept)	85.355	0.730		116.966	< .001
	MidtermExam					
H <sub>1</sub>	(Intercept)	17.418	4.989		3.491	< .001
	MidtermExam	0.797	0.058	0.846	13.659	< .001

## Descriptive Statistics-Section and FinalExam

Descriptive Statistics

	FinalExam	
	1	2
Valid	41	35
Missing	0	0
Mean	86.195	84.371
Std. Deviation	6.750	5.816
IQR	9.000	9.000
Minimum	72.000	70.000
Maximum	100.000	92.000

## Boxplots



## Independent Samples T-Test-Section and FinalExam

Independent Samples T-Test

	t	df	p	Mean Difference	SE Difference	95% CI for Mean Difference		Cohen's d	SE Cohen's d
						Lower	Upper		
FinalExam	1.250	74	0.215	1.824	1.459	-1.083	4.730	0.288	0.232

Note. Student's t-test.

## Descriptives

Group Descriptives

	Group	N	Mean	SD	SE	Coefficient of variation
FinalExam	1	41	86.195	6.750	1.054	0.078
	2	35	84.371	5.816	0.983	0.069

## Reporting of Results

Data were collected from a sample of 76 students. Two primary research questions were addressed:

1. Can midterm exam scores be used to predict final exam scores? (Use the data from both sections)
2. Did the average final exam scores of students in the two sections differ?

First the relationship between midterm exam scores and final exam scores was examined. In this sample the mean midterm exam score was 85.25 (SD = 6.755) and the mean final exam score was 85.355 (SD= 6.362); both distributions were two-tailed and approximately normally distributed. The results were statistically significant. The relationship between the two variables is linear and positive with a strong level of strength ( $r = .846$ ,  $p < .001$ ,  $R\text{-squared} = .716$ ). There is evidence of a relationship between midterm exam scores and final exam scores.

Second, the average final exam scores in two different sections were compared. In the sample the average final exam score in section 1 was 86.195 (SD = 6.75) and the average final exam score in section 2 was 84.371 (SD = 5.816). Due to the final exam scores being from two different sections a two independent means t-test was conducted. The data were approximately normally distributed. The difference was not statistically significant [ $t(74) = 1.25$ ,  $p = .215$ ] with a small to moderate effect size ( $d = 0.288$ ). The results suggest that the final exam scores of students in the two sections did not differ.

Future research should continue to be conducted to explore the relationship between midterm exam scores and final exam scores. Further research should also be conducted in comparing the relationship between courses of similarity taught by different instructors during the same time. It is important to repeat research in the same categories to compare the results over time. For example, if in a future statistical analysis, the comparison of two sections of identical details show statistical significance with regards to the difference in average final exam scores in two comparable courses it would be important to look into the details further to try to learn why. At which point changes to be made could be suggested to the professors of the course with the lower average final exam score.