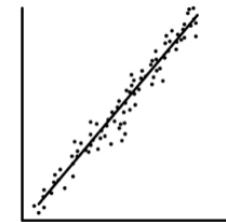
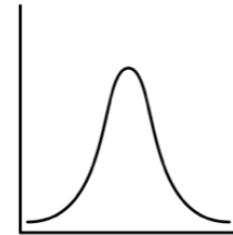
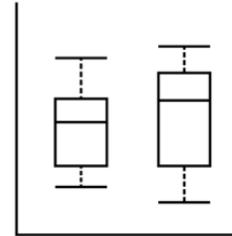


PSYC 2300

Introduction to Statistics



Lecture 15: Making predictions using regression

Outline for today

- Updates
- Review parts of last class
- Simple Linear Regression
- Multiple Regression
- Regressions in JASP
 - Download [Stats Class 17 Dataset \(Regressions\).jasp](#)



Updates

- **Final Exam** is scheduled for Thursday March 17, 2022 08:00-09:50am MT
- **Application Project** data and instructions will be posted this afternoon
 - Each focuses on descriptive statistics (mean, range), correlation, independent samples *t*-test, and factorial ANOVA
 - We will talk about these projects specifically during the next two class sessions

Review

Testing relationships using correlations

Calculating Correlations

Pearson's *r*

$$r_{xy} = \frac{n \sum XY - \sum X \sum Y}{\sqrt{[n \sum X^2 - (\sum X)^2][n \sum Y^2 - (\sum Y)^2]}}$$

We just need six values:

$$\begin{array}{ll}\sum X & \sum X^2 \\ \sum Y & \sum Y^2 \\ \sum XY & n\end{array}$$

Correlations: Hypothesis Testing

Null Hypothesis H_0

There is no relationship

$$H_0: \rho = 0$$

Alternative Hypothesis H_a

There is a relationship

$$H_a: \rho \neq 0$$

Note: ρ is "rho", the population parameter version of the sample statistic, r

t-test for correlation coefficient

t-test for correlation coefficient

$$t_{r_{xy}} = \frac{r_{xy}\sqrt{n - 2}}{\sqrt{1 - r_{xy}^2}}$$

r_{xy} = the correlation between the two variables

r_{xy}^2 = the coefficient of determination

n = the sample size (number of paired observations)

t-test for correlation coefficient

Step 1: Calculate Pearson's r

$$r_{xy} = \frac{126}{\sqrt{(213)(192)}} = 0.62$$

Step 2: Calculate the coefficient of determination

$$r_{xy}^2 = 0.62^2 = 0.38$$

***t*-test for correlation coefficient**

$$t_{r_{xy}} = \frac{r_{xy}\sqrt{n-2}}{\sqrt{1-r_{xy}^2}}$$

Step 3: Solve for the *t*-test statistic for correlations

$$t_{xy} = \frac{0.62\sqrt{6-2}}{\sqrt{1-0.38}}$$

Simple Linear Regression

Types of Models

- For ANOVAs, your factors need to be *nominal* or *ordinal*
 - These are called **mean structure models** because we seek to explain mean differences between groups or treatment conditions
- We also have **regression models**, however, which allows you to have *interval* or *ratio* variables on the x -axis

Simple Example

We want to predict **Total Cost** based on the **Number of drinks** you buy at a dance contest



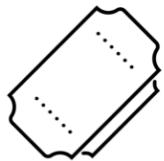
Simple Example

Total cost = Cover Charge + \$8.00 per drink



Simple Example

Total cost = Cover Charge + \$8.00 per drink



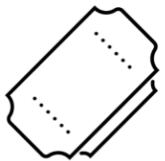
Total cost = \$15.00 + \$8.00x



\$15 + \$8(1) = \$23.00

Simple Example

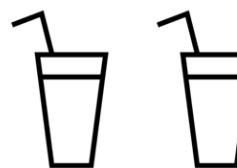
Total cost = Cover Charge + \$8.00 per drink



$$\text{Total cost} = \$15.00 + \$8.00x$$



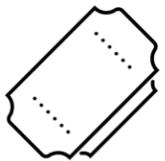
$$\$15 + \$8(1) = \$23.00$$



$$\$15 + \$8(2) = \$31.00$$

Simple Example

Total cost = Cover Charge + \$8.00 per drink



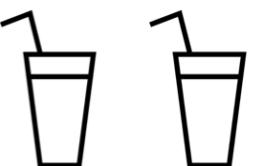
$$\text{Total cost} = \$15.00 + \$8.00x$$



$$\$15 + \$8(1) = \$23.00$$

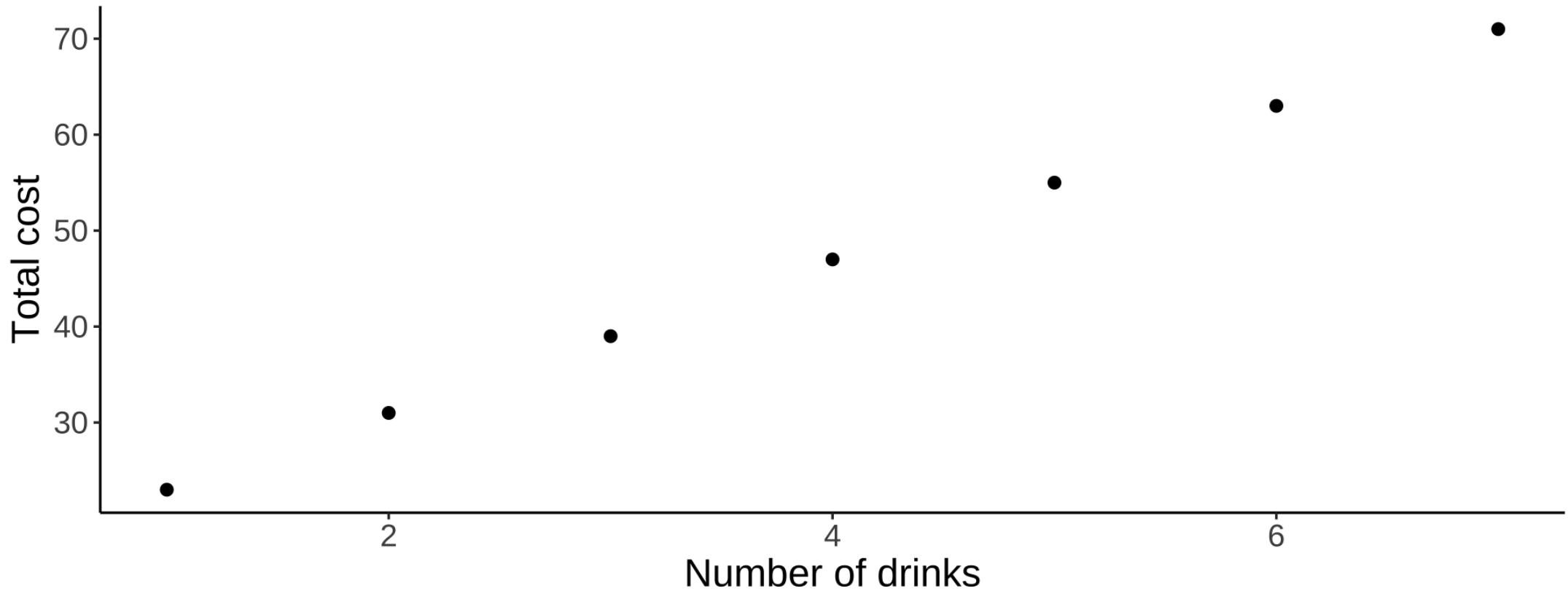


$$\$15 + \$8(2) = \$31.00$$

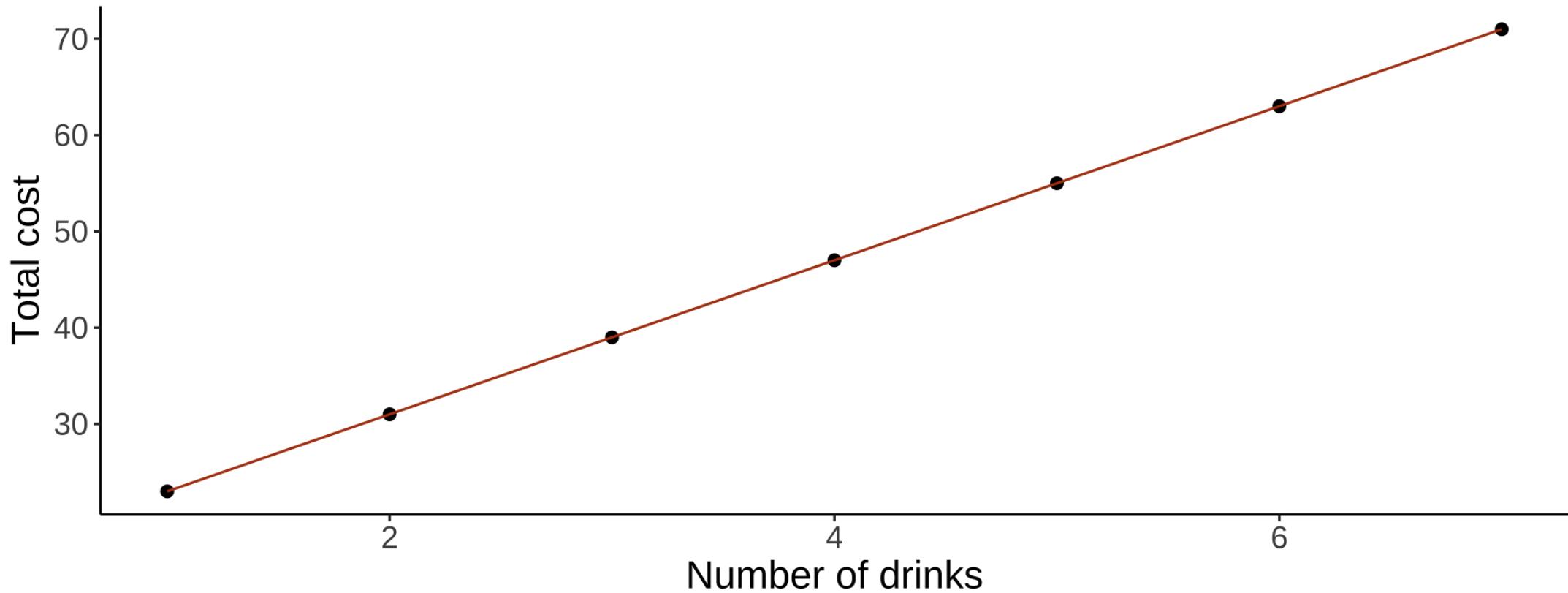


$$\$15 + \$8(3) = \$39.00$$

Simple Example



Simple Example



The Problem

- Typically, however, we will have error (which is not reflected in this model)
 - For example, different drinks cost different amounts

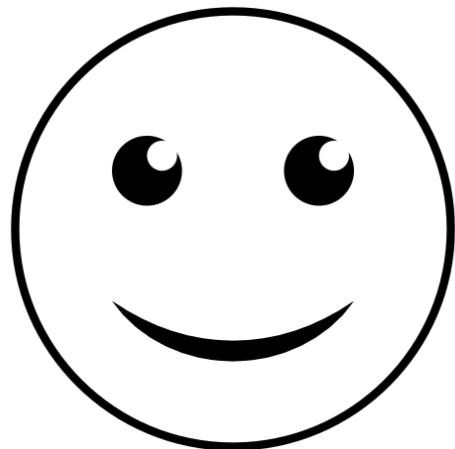
Total cost = Cover Charge + x per drink	<i>Drinks</i>	
		
		\$8.00
		\$9.00
		\$8.00
		\$12.00
		\$12.00
		\$4.00
		\$3.00
		\$5.00

- Or if we have **sampling error** more generally

Another Example

Predicting **Final Grade** based on the number of **Hours Studied**

Two people who study the same amount may not get the same final grade



Studied 8 hours

83%



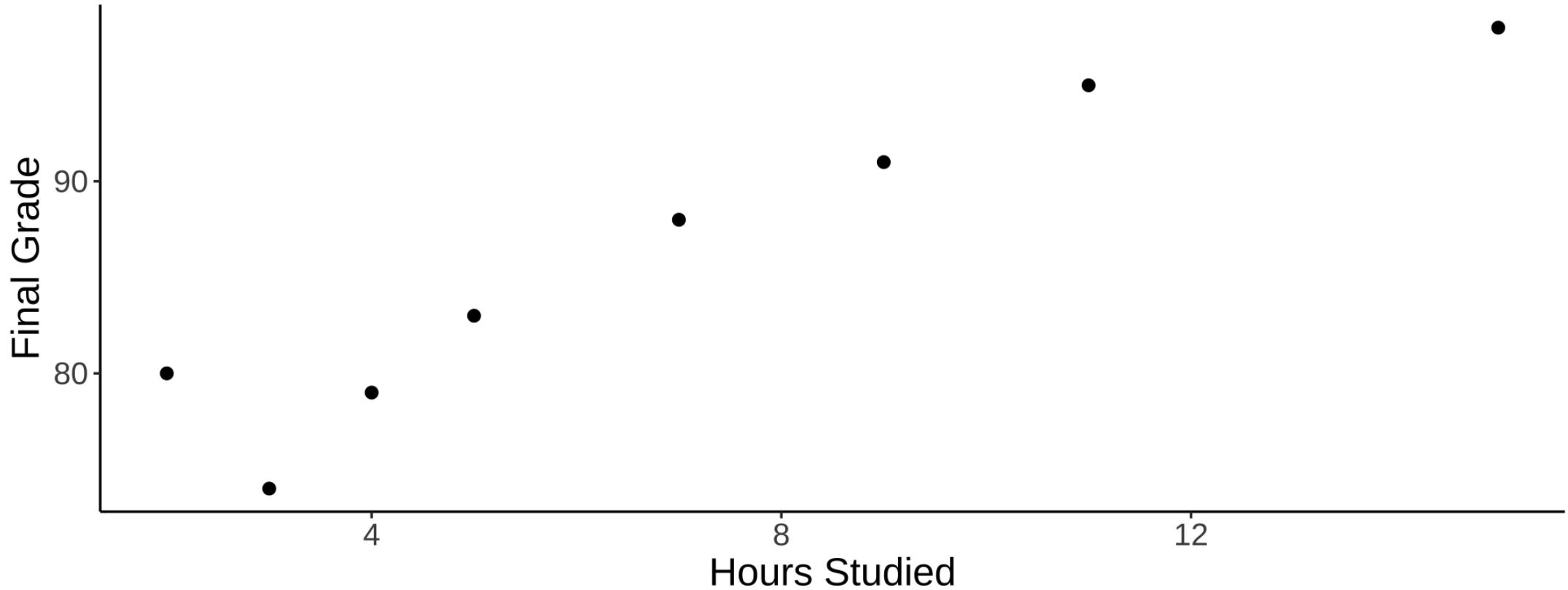
Studied 8 hours

62%

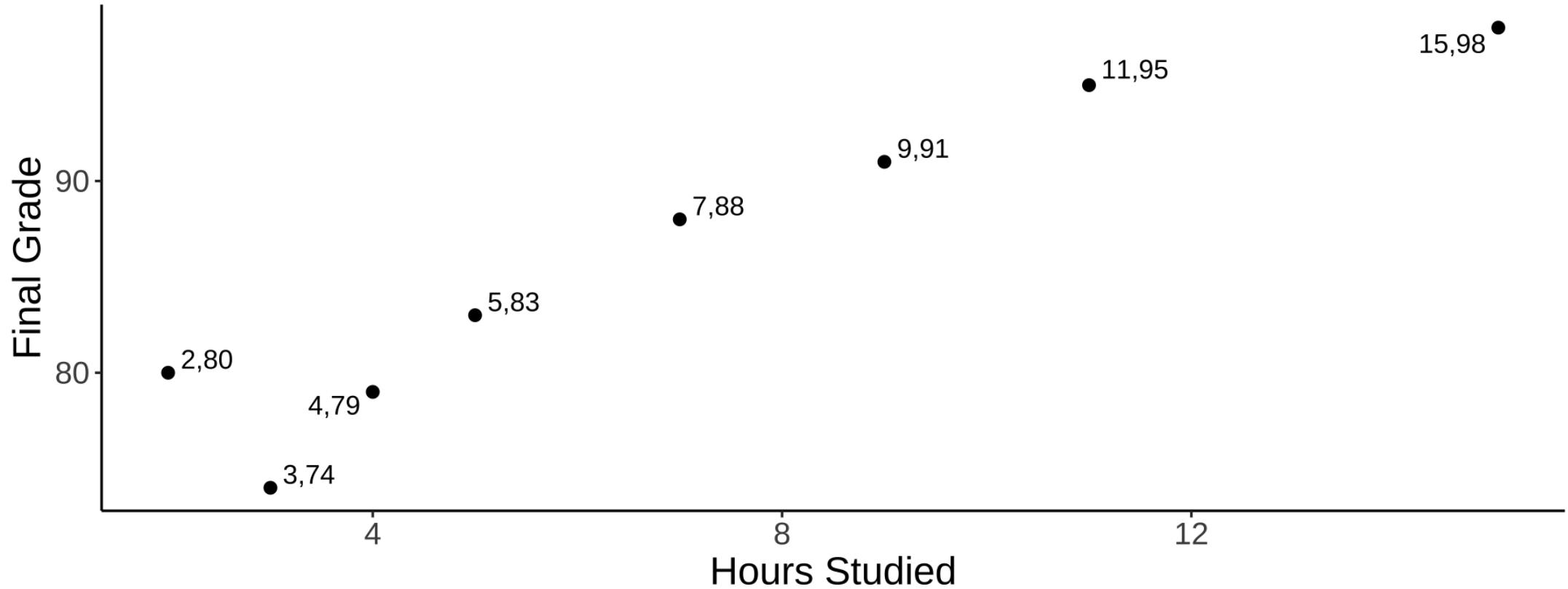
Predicting Grades from Hours Studied

Student	Hours_Studied	Final_Grade
Niwako	7	88
Kamiko	5	83
John	9	91
Ahmed	2	80
Jimothy	4	79
Jane	11	95
Jaleel	15	98
Steve	3	74

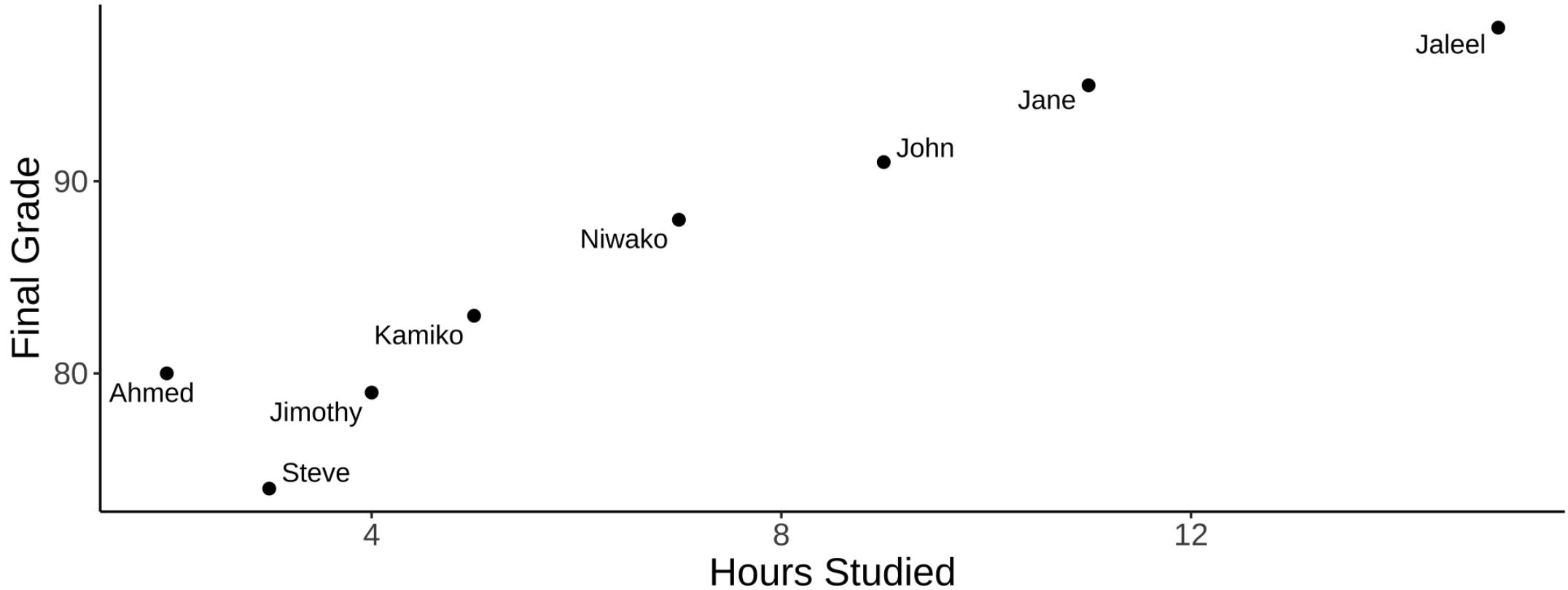
Predicting Grades from Hours Studied



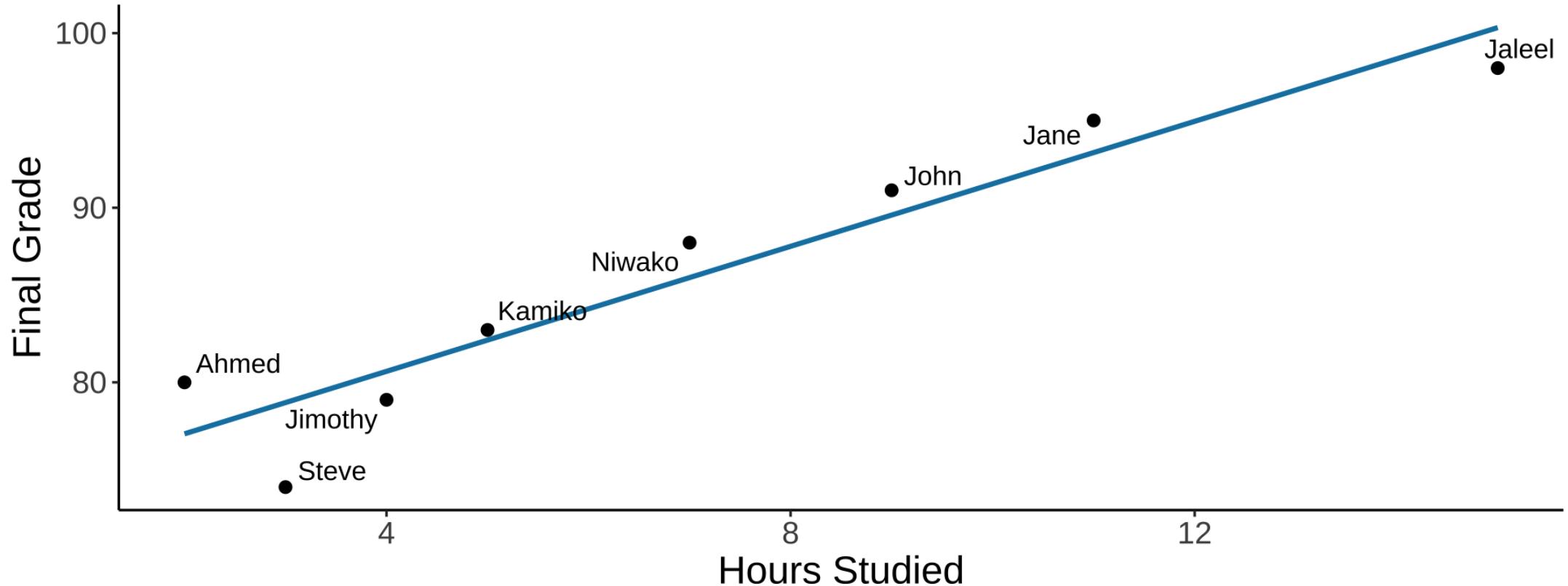
Predicting Grades from Hours Studied



Predicting Grades from Hours Studied



Predicting Grades from Hours Studied

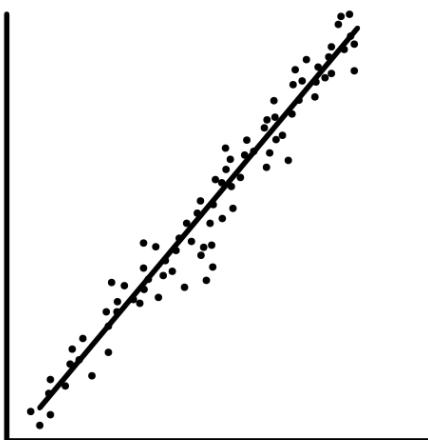


The blue line represents the **Regression Line**

Regression

Regression: A statistical technique for finding the best-fitting *line* (i.e., the regression line) for a set of data

Goal: To be able to model the quantitative relationship between two variables, allowing us to make *predictions* about one on the basis of the other



Statistical Hypotheses

Null Hypothesis H_0

The slope of the regression equation, b (or "beta") is zero

Alternative Hypothesis H_a

The slope of the regression equation, b (or "beta") is not zero

We'll see how this is applied when using JASP

Example

Research question: How much does each additional hour of studying, on average, help our final grade?



Simple Linear Regression

Simple linear regression

$$\hat{y} = bX + a$$

Slope

$$b = \frac{\sum XY - \frac{\sum x \sum y}{n}}{\sum X^2 - \frac{(\sum X)^2}{n}}$$

Intercept

$$a = \frac{\sum Y - b \sum X}{n}$$

Review: Correlation

Pearson's *r*

$$r_{xy} = \frac{n \sum XY - \sum X \sum Y}{\sqrt{[n \sum X^2 - (\sum X)^2][n \sum Y^2 - (\sum Y)^2]}}$$

Once again, *these* are the values we need:

$$\begin{array}{ll}\sum X & \sum X^2 \\ \sum Y & \sum Y^2 \\ \sum XY & n\end{array}$$

Calculating the regression line

Set up our table

i	x	y	x^2	y^2	xy
1	5	6			
2	9	11			
3	10	6			
4	3	4			
5	5	6			
6	7	9			

Calculating the regression line

Square our x values

i	x	y	x^2	y^2	xy
1	5	6	25		
2	9	11	81		
3	10	6	100		
4	3	4	9		
5	5	6	25		
6	7	9	49		

Calculating the regression line

Square our y values

i	x	y	x^2	y^2	xy
1	5	6	25	36	
2	9	11	81	121	
3	10	6	100	36	
4	3	4	9	16	
5	5	6	25	36	
6	7	9	49	81	

Calculating the regression line

Multiply x and y together row-wise

i	x	y	x^2	y^2	xy
1	5	6	25	36	30
2	9	11	81	121	99
3	10	6	100	36	60
4	3	4	9	16	12
5	5	6	25	36	30
6	7	9	49	81	63

Calculating the regression line

i	x	y	x^2	y^2	xy
1	5	6	25	36	30
2	9	11	81	121	99
3	10	6	100	36	60
4	3	4	9	16	12
5	5	6	25	36	30
6	7	9	49	81	63

Sum each of the columns

$\sum x$	$\sum y$	$\sum x^2$	$\sum y^2$	$\sum xy$
39	42	289	326	294

Calculating the regression line

Slope

$$b = \frac{\sum XY - \frac{\sum x \sum y}{n}}{\sum X^2 - \frac{(\sum X)^2}{n}}$$

$\sum x$	$\sum y$	$\sum x^2$	$\sum y^2$	$\sum xy$
39	42	289	326	294

$$b = \frac{294 - \frac{(39)(42)}{6}}{289 - \frac{(39)^2}{6}}$$

$$b = \frac{294 - 273}{289 - 253.5} = \frac{21}{35.5} = 0.59$$

Calculating the regression line

Intercept

$$a = \frac{\Sigma Y - b \Sigma X}{n}$$

$\sum x$	$\sum y$	$\sum x^2$	$\sum y^2$	$\sum xy$
39	42	289	326	294

Slope, $b = 0.59$

$$a = \frac{42 - (0.59)(39)}{6} = \frac{18.99}{6} = 3.16$$

Calculating the regression line

Simple linear regression

$$\hat{y} = bX + a$$

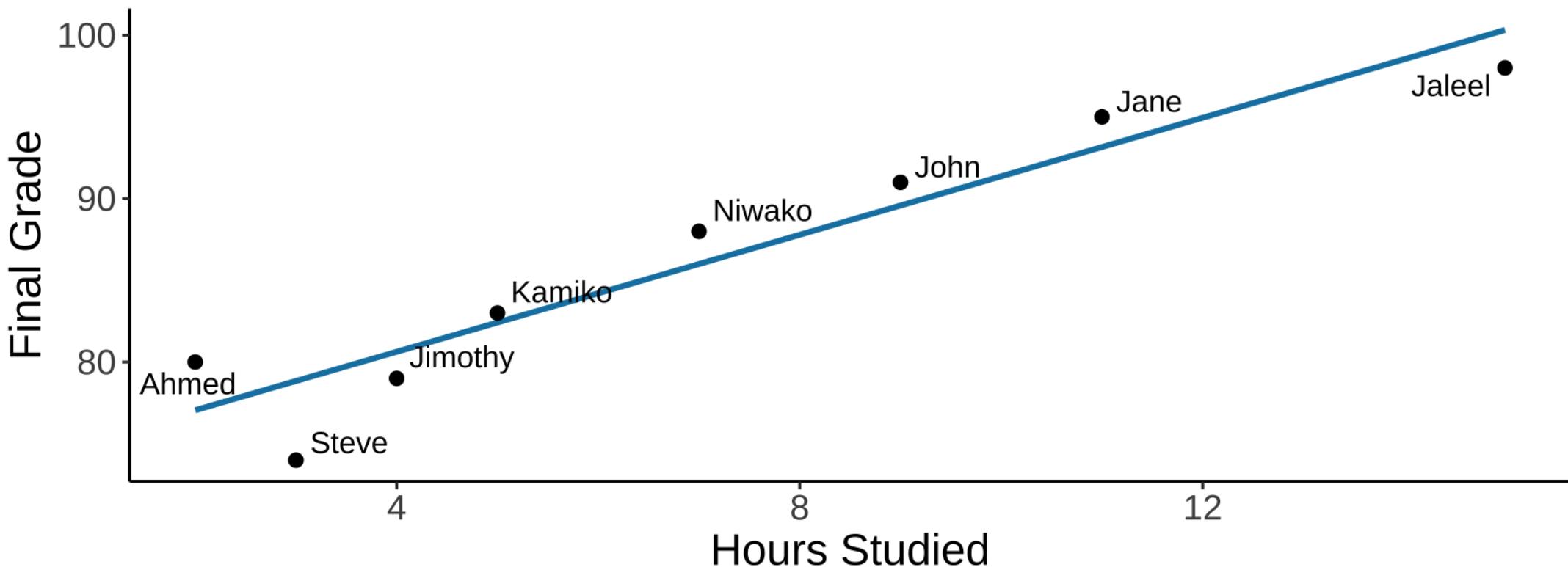
Slope: $b = 0.59$

Intercept: $a = 3.16$

$$\hat{y} = 0.59X + 3.16$$

Back to our previous example

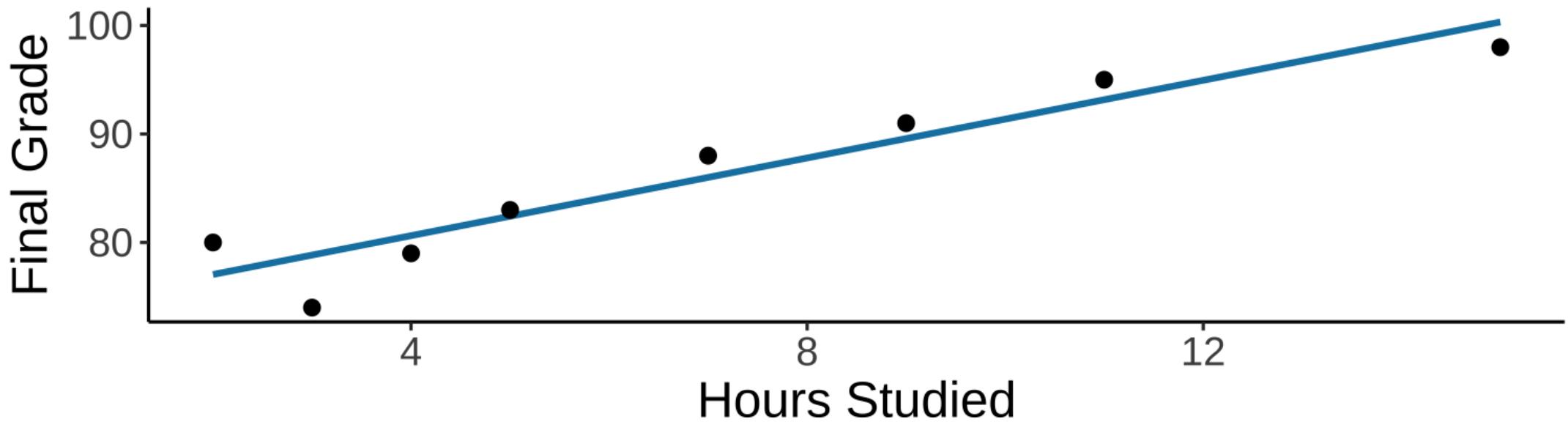
Research question: How much does each additional hour of studying, on average, help our final grade?



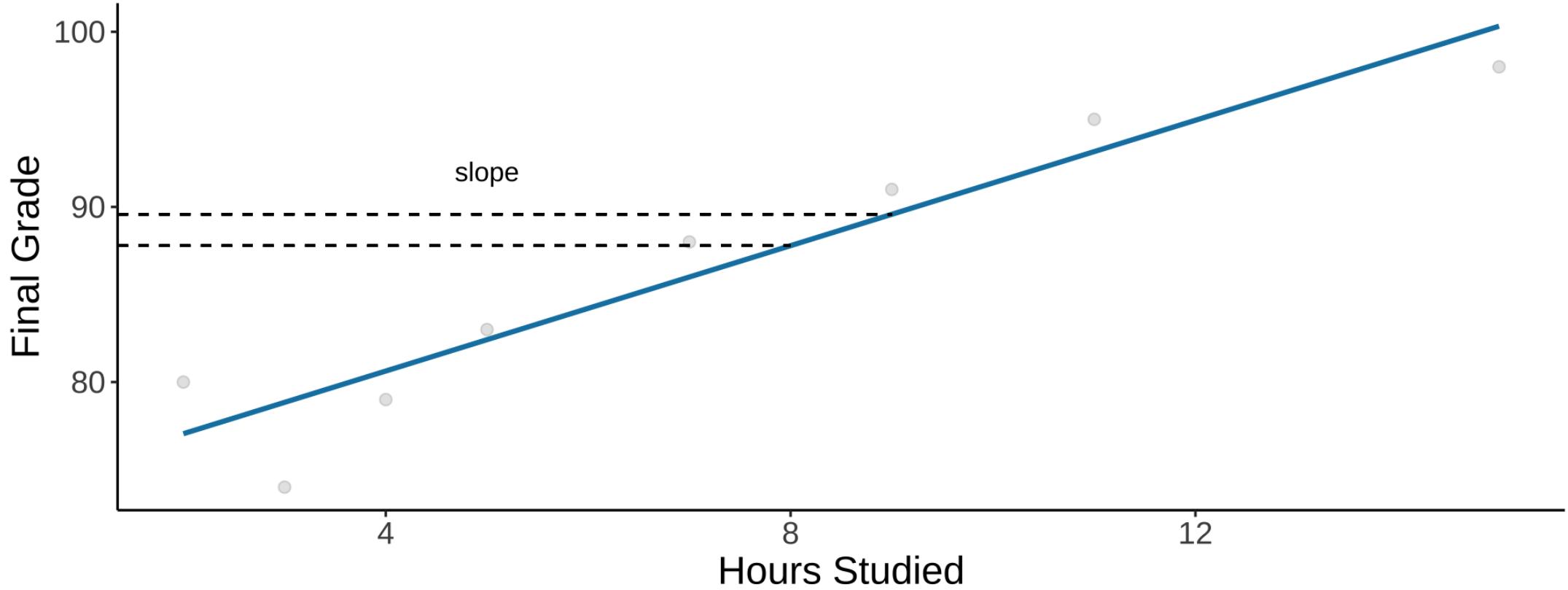
Visualizing the Regression Formula

$$\hat{y} = bX + a + \epsilon$$

$$\hat{y} = 1.79X + 73.47$$



Visualizing b in the Regression Formula

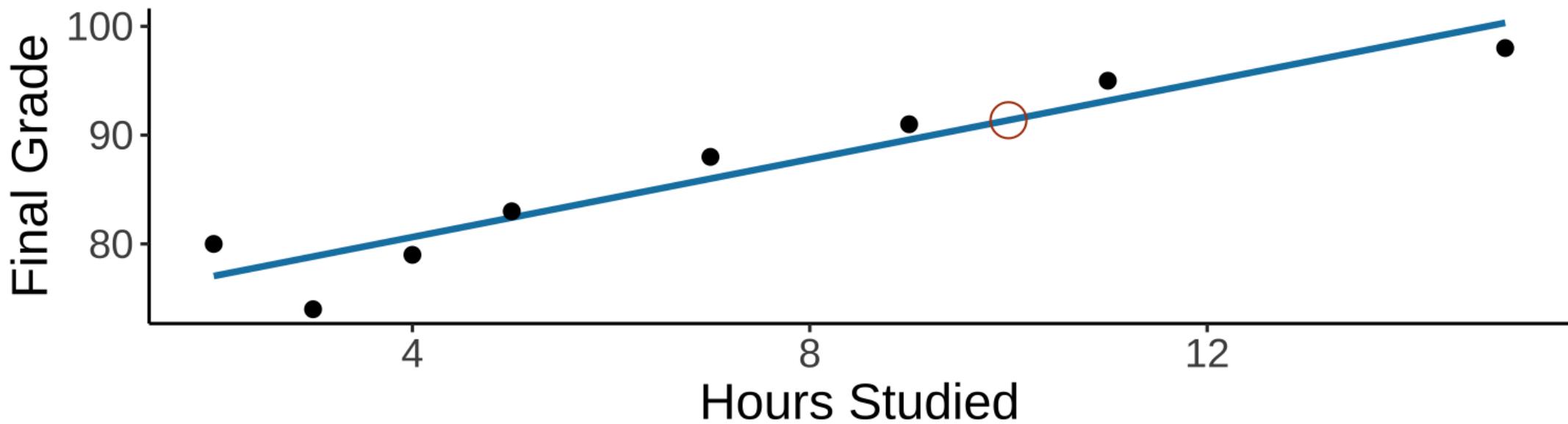


Slope determines how much the y variable changes when X is increased by 1 point (or unit)

Visualizing X in the Regression Formula

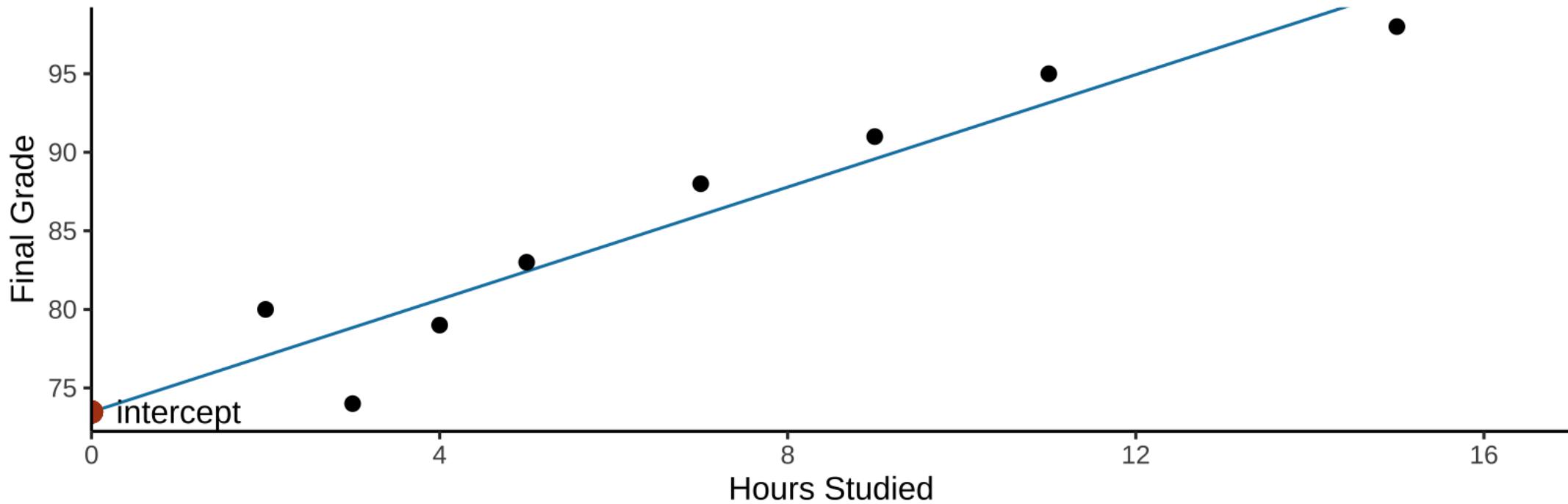
What if a student studied for 10 hours?

$$\hat{y} = 1.79(10) + 73.47 = 91.37$$



Visualizing a in the Regression Formula

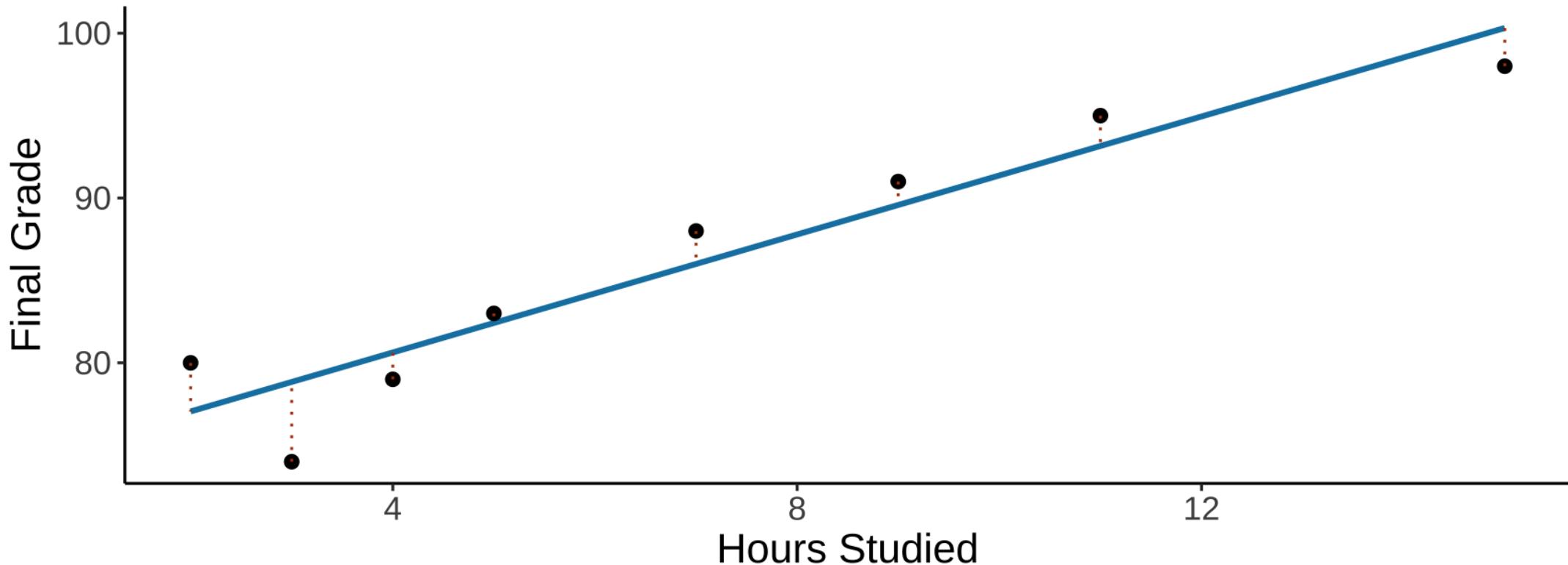
What if a student studied for 0 hours?



The y -intercept, a , is the value of y when X is 0

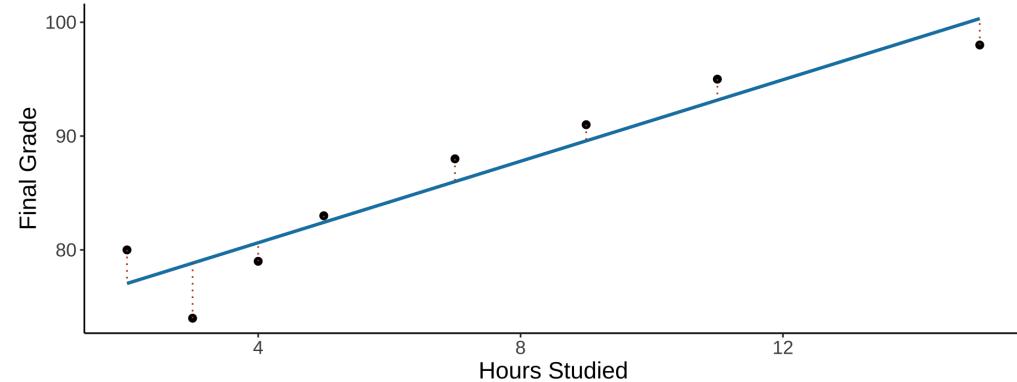
Visualizing ϵ in the Regression Formula

The model is not perfect; $residuals = y - \hat{y}$



Visualizing ϵ in the Regression Formula

Final_Grade	Prediced_Grade	Residual
88	86.00	2.00
83	82.42	0.58
91	89.58	1.42
80	77.05	2.95
79	80.63	-1.63
95	93.16	1.84
98	100.32	-2.32
74	78.84	-4.84

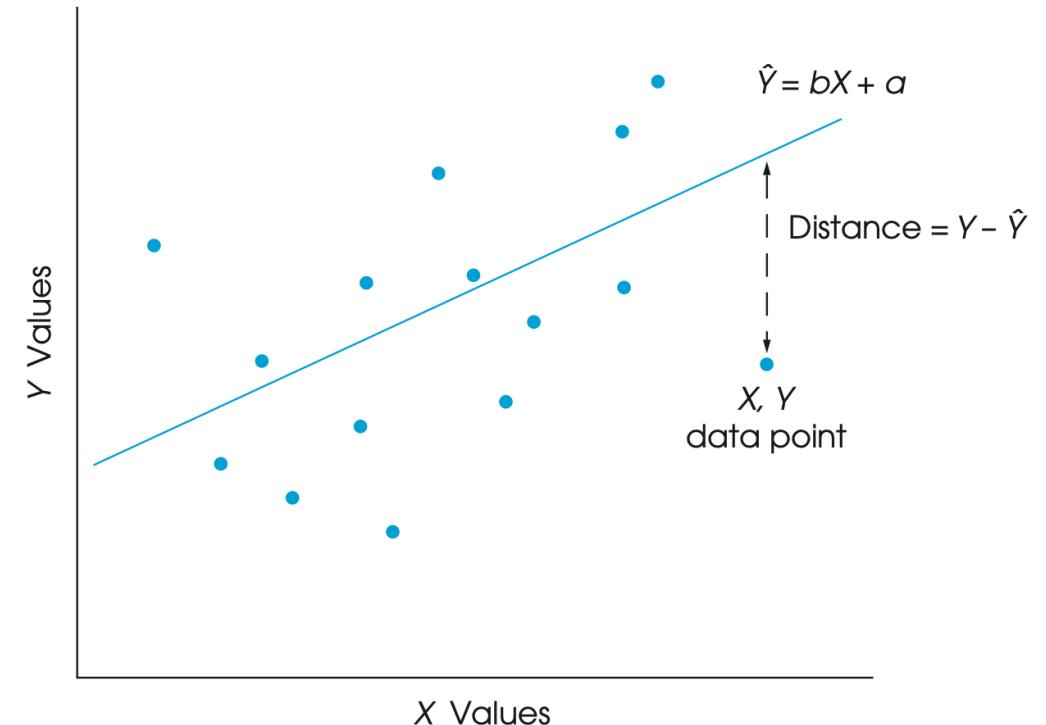


Model Error

- The best-fitting line is the one that has the *smallest* total squared error

$$\text{Total Squared Error} = \sum(y - \hat{y})^2$$

- The resulting line of our linear regression is commonly called the **least-squared-error solution**



For quizzes and exams, you do not need to know this equation

Simple Linear Regression

Simple linear regression

$$\hat{y} = bX + a$$

- \hat{y} is the predicted value
- b determines how much the y variable changes when x is increased by 1 point (or unit of measurement)
- a is the value of y when x is zero

Slope

$$b = \frac{\Sigma XY - \frac{\Sigma x \Sigma y}{n}}{\Sigma X^2 - \frac{(\Sigma X)^2}{n}}$$

Intercept

$$a = \frac{\Sigma Y - b \Sigma X}{n}$$

JASP: Linear Regression

JASP: Linear Regression

We want to know whether the variables Hours Studied and Motivation play a role in determining students' Final Grade.

The screenshot shows the JASP software interface. At the top, there is a menu bar with three colored dots (red, yellow, green) and the title "Stats Class 17 Dataset (regressions)* (/Users/Sabby/Desktop)". Below the menu is a toolbar with various statistical analysis icons: Descriptives, T-Tests, ANOVA, Mixed Models, Regression (highlighted with a blue arrow), Frequencies, Factor, and Reliability. To the right of the toolbar are two blue arrows pointing from the text above to the "Hours Studied" and "Motivation" columns in the data table. The data table itself has columns for Student ID, Student Name, Hours Studied, Motivation, and Final Grade. The data is as follows:

	Student	Hours Studied	Motivation	Final Grade
1	Niwako	7	6	88
2	Kamiko	5	4	83
3	John	9	7	91
4	Ahmed	2	2	80
5	Jimothy	4	2	79
6	Jane	11	9	95
7	Jaleel	15	9	98
8	Steve	3	5	74

JASP: Linear Regression

A great place to start is by looking at the correlations between these variables, so let's click on "Correlation" under "Regression."

The screenshot shows the JASP software interface. At the top, there is a toolbar with various statistical analysis icons: Descriptives, T-Tests, ANOVA, Mixed Models, Regression, Frequencies, Factor, and Reliability. The 'Regression' icon is highlighted with a blue arrow pointing from the text above. A dropdown menu is open under the 'Regression' icon, showing two sections: 'Classical' and 'Bayesian'. Under 'Classical', 'Correlation' is selected and highlighted with a blue box. Other options in the 'Classical' section include 'Linear Regression' and 'Logistic Regression'. Under 'Bayesian', 'Correlation' is listed, followed by 'Linear Regression'. Below the toolbar, there is a data table titled 'Stats Class 17 Dataset (Regressions)' containing 8 rows of student data with columns for Student, Hours Studied, Motivation, and Final Grade.

	Student	Hours Studied	Motivation	Final Grade
1	Niwako	7	6	88
2	Kamiko	5	4	83
3	John	9	7	91
4	Ahmed	2	2	80
5	Jimothy	4	2	79
6	Jane	11	9	95
7	Jaleel	15	9	98
8	Steve	3	5	74

JASP: Linear Regression

Place all three of our interval-ratio variables in the “Variables” box to begin constructing the correlation table.

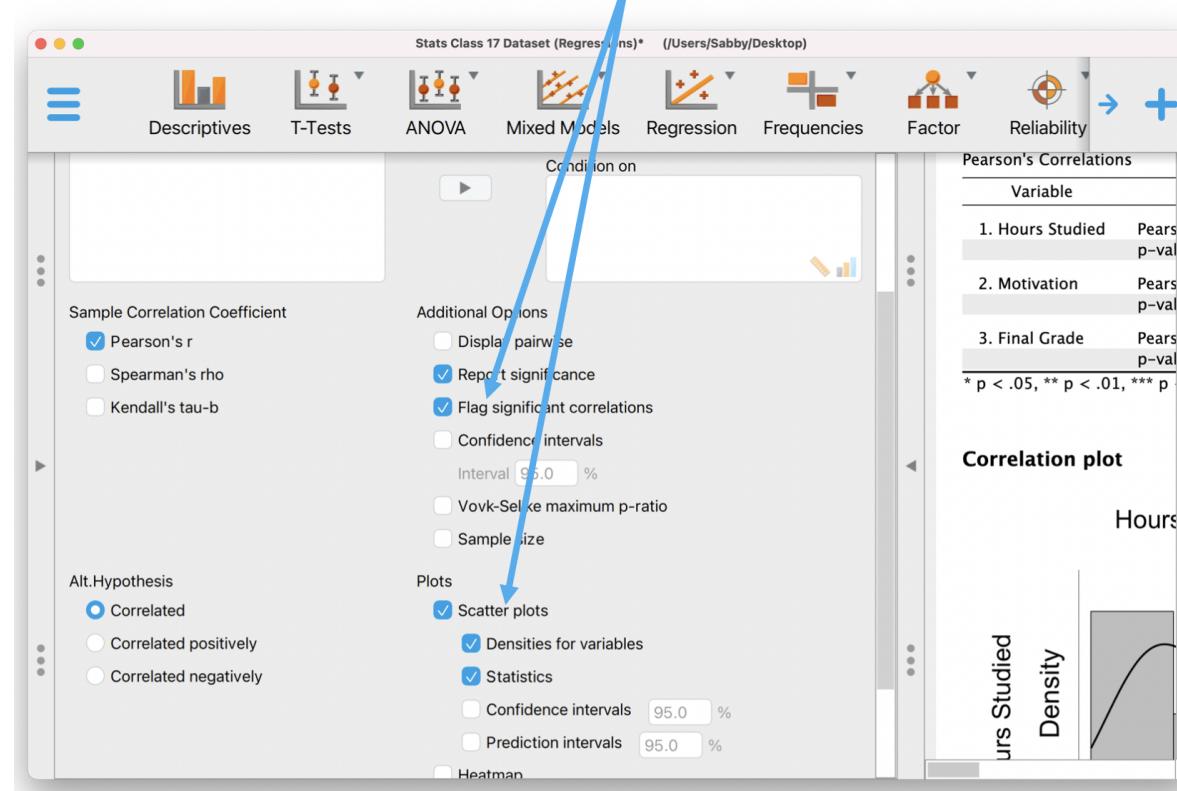
The screenshot shows the JASP software interface with the following details:

- Toolbar:** Descriptives, T-Tests, ANOVA, Mixed Models, Regression, Frequencies, Factor, Reliability.
- Correlation Dialog:**
 - Variables:** Hours Studied, Motivation, Final Grade.
 - Condition on:** (empty)
 - Sample Correlation Coefficient:** Pearson's r (selected), Spearman's rho, Kendall's tau-b.
 - Additional Options:** Display pairwise, Report significance (selected), Flag significant correlations, Confidence intervals, Vovk-Sellke maximum p-ratio, Sample size.
- Results Panel:** Correlation table for Pearson's Correlations.

Variable	1. Hours Studied	2. Motivation	3. Final Grade
1. Hours Studied	Pearson p-value		
2. Motivation	Pearson p-value		
3. Final Grade	Pearson p-value		

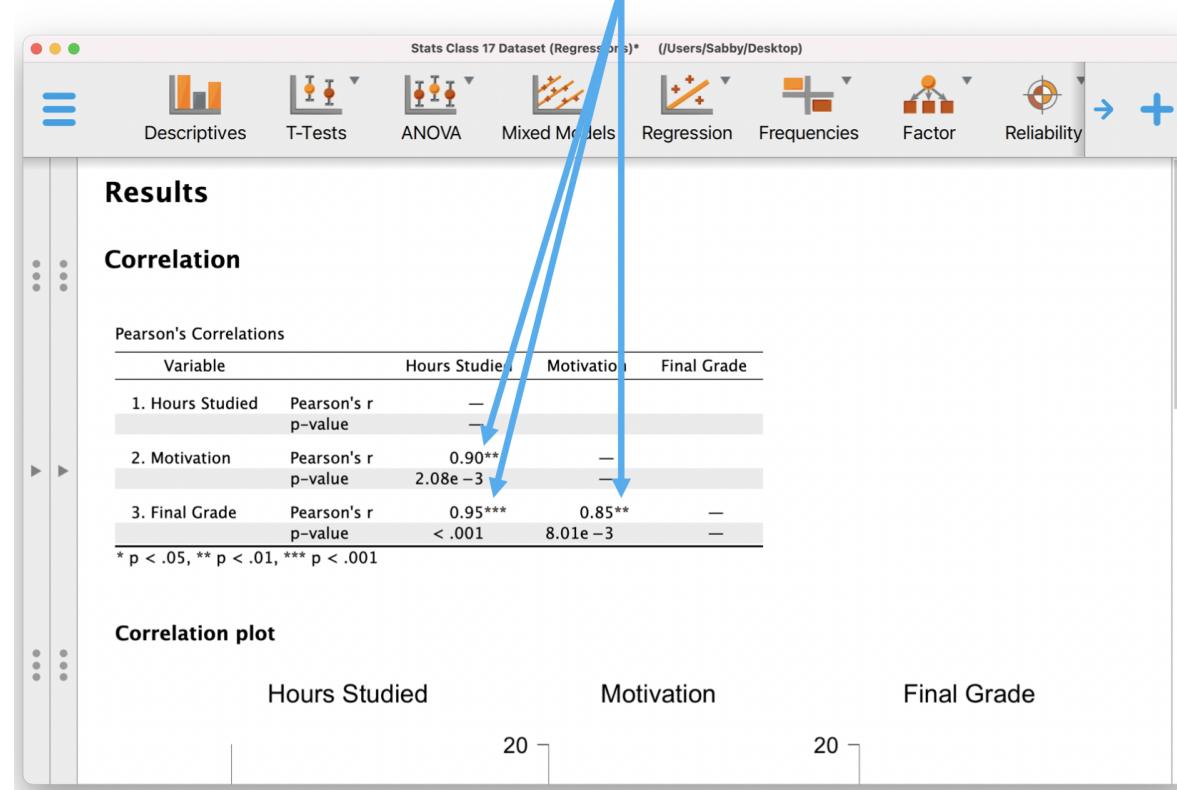
JASP: Linear Regression

Select “Flag significant correlations,” “Scatter plots,” “Densities for variables,” and “Statistics” as additional options.



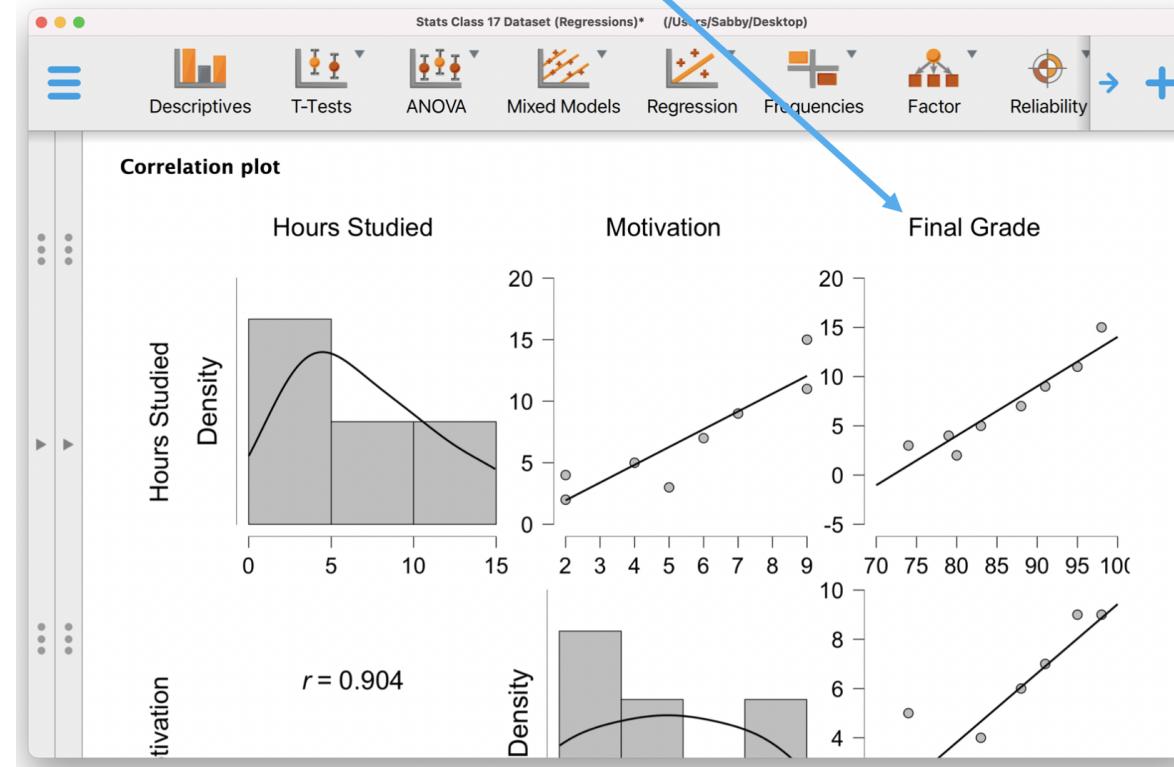
JASP: Linear Regression

All the pairwise correlations came out significant (i.e., each p is less than .05), with each being a positive relationship.



JASP: Linear Regression

We can see these positive correlations visually by looking at the scatterplot matrix. Notice, e.g., Hours Studied vs. Final Grade.



JASP: Linear Regression

Okay, let's start with a simple linear regression of Hours Studied onto Final Grade by selecting the "Linear Regression" menu.



JASP: Linear Regression

Put Final Grade in the “Dependent Variable” box and Hours Studied in the “Covariates” box. JASP runs the regression!

The screenshot shows the JASP software interface for performing a linear regression analysis. The top menu bar includes options like Descriptives, T-Tests, ANOVA, Mixed Models, Regression, Frequencies, Factor, Reliability, and a plus sign for new analyses. The main window has a sidebar with a tree view showing 'Linear Regression' selected. In the center, there are three main input fields: 'Dependent Variable' containing 'Final Grade', 'Covariates' containing 'Hours Studied', and 'WLS Weights (optional)'. To the right, the results panel displays the 'Linear Regression' output, which includes a 'Model Summary' table and an 'ANOVA' table. The 'Model Summary' table shows Model R values for H₀ (0.00) and H₁ (0.95). The 'ANOVA' table shows the Regression, Residual, and Total models. A note at the bottom states 'Note. The intercept model is'.

Model	R
H ₀	0.00
H ₁	0.95

Model	
H ₁	Regression Residual Total

JASP: Linear Regression

R² is the coefficient of determination that tells you what percentage of the variance in the DV your model is capturing. 90% – very good!

The screenshot shows the JASP software interface with the title bar "Stats Class 17 Dataset (Regressions) * (/Users/Sabby/Desktop)". The top menu bar includes Descriptives, T-Tests, ANOVA, Mixed Models, Regression (selected), Frequencies, Factor, Reliability, and a New Project icon.

The main window displays the results of a "Linear Regression" analysis:

- Model Summary – Final Grade**

Model	R	R ²	Adjusted R ²	RMSE
H ₀	0.00	0.00	0.00	8.38
H ₁	0.95	0.90	0.88	2.88
- ANOVA**

Model	Sum of Squares	df	Mean Square	F	p
H ₁ Regression	442.09	1	442.09	53.15	< .001
Residual	49.91	6	8.32		
Total	492.00	7			

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

Model	Unstandardized	Standard Error	Standardized	t	p
H ₀ (Intercept)	86.00	2.96		29.01	< .001
H ₁ (Intercept)	73.47	2.00		36.77	< .001
	Hours Studied	1.79	0.25	0.95	7.29 < .001

JASP: Linear Regression

You'll want to ignore the ANOVA section for our purposes and focus on the "Coefficients" output, which gives us the values we need.

The screenshot shows the JASP interface with the title bar "Stats Class 17 Dataset (Regressions*) (/Users/Sabby/Desktop)". The top menu bar includes Descriptives, T-Tests, ANOVA, Mixed Models, Regression (selected), Frequencies, Factor, Reliability, and a plus sign for new analyses. The main window displays the "Linear Regression" analysis results:

Model Summary – Final Grade

Model	R	R ²	Adjusted R ²	RMSE
H ₀	0.00	0.00	0.00	8.38
H ₁	0.95	0.90	0.88	2.88

ANOVA

Model	Sum of Squares	df	Mean Square	F	p
H ₁ Regression	442.09	1	442.09	53.15	< .001
Residual	49.91	6	8.32		
Total	492.00	7			

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

Coefficients

Model	Unstandardized	Standard Error	Standardized	t	p
H ₀ (Intercept)	86.00	2.96		29.01	< .001
H ₁ (Intercept)	73.47	2.00	36.77	< .001	
	Hours Studied	1.79	0.25	7.29	< .001

JASP: Linear Regression

The unstandardized (Intercept) term represents the “a” term in our formula for the regression line of best fit.

The screenshot shows the JASP software interface with the following details:

- Toolbar:** Descriptives, T-Tests, ANOVA, Mixed Models, Regression, Frequencies, Factor, Reliability.
- Current Analysis:** Linear Regression.
- Model Summary - Final Grade:**

Model	R	R ²	Adjusted R ²	RMSE
H ₀	0.00	0.00	0.00	8.38
H ₁	0.95	0.90	0.88	2.88
- ANOVA:**

Model	Sum of Squares	df	Mean Square
H ₁	Regression	442.09	1
	Residual	49.91	6
	Total	492.00	7

Note: The intercept model is omitted, as no meaningful information can be shown.
- Coefficients:**

Model	Unstandardized	Standard Error	Standardized	t	p
H ₀	(Intercept)	86.00	2.96	29.01	< .001
H ₁	(Intercept)	73.47	2.00	36.77	< .001
	Hours Studied	1.79	0.25	7.29	< .001

JASP: Linear Regression

The unstandardized Hours Studied coefficient represents “b,” which in this case is a significant effect (the slope’s $p < .001$).

The screenshot shows the JASP software interface with the following sections:

- Top Bar:** Descriptives, T-Tests, ANOVA, Mixed Models, Regression, Frequencies, Factor, Reliability.
- Title:** Stats Class 17 Dataset (Regressions)* (/Users/Sabby/Desktop)
- Section Header:** Linear Regression
- Model Summary - Final Grade:**

Model	R	R ²	Adjusted R ²	RMSE
H ₀	0.00	0.00	0.00	8.38
H ₁	0.95	0.90	0.88	2.88
- ANOVA:**

Model	Sum of Squares	df	Mean Square
H ₁ Regression	442.09	1	442.09
Residual	49.91	6	8.32
Total	492.00	7	

Note: The intercept model is omitted, as no meaningful information can be shown.
- Coefficients:**

Model	Unstandardized	Standard Error	Standardized	t	p
H ₀ (Intercept)	86.00	2.96		29.01	< .001
H ₁ (Intercept)	73.47	2.00	0.95	36.77	< .001
	Hours Studied	1.79	0.25	7.29	< .001

A blue arrow points from the formula box to the "Hours Studied" entry in the Coefficients table.

$$b = \frac{\sum XY - \frac{\sum X \sum Y}{n}}{\sum X^2 - \frac{(\sum X)^2}{n}}$$

JASP: Linear Regression

So, the regression line of best fit for this particular regression model is Final Grade = 1.79*Hours Studied + 73.47.

The screenshot shows the JASP software interface with a blue header bar. Below the header, there is a toolbar with various icons for different statistical analyses: Descriptives, T-Tests, ANOVA, Mixed Models, Regression, Frequencies, Factor, and Reliability. The 'Regression' icon is highlighted with a blue border. The main window displays the results of a 'Linear Regression' analysis on a dataset named 'Stats Class 17 Dataset (Regressions)*'. The results are presented in three sections: 'Model Summary - Final Grade', 'ANOVA', and 'Coefficients'.

Model Summary - Final Grade

Model	R	R ²	Adjusted R ²	RMSE
H ₀	0.00	0.00	0.00	8.38
H ₁	0.95	0.90	0.88	2.88

ANOVA

Model	Sum of Squares	df	Mean Square	F	p
H ₁ Regression	442.09	1	442.09	53.15	< .001
Residual	49.91	6	8.32		
Total	492.00	7			

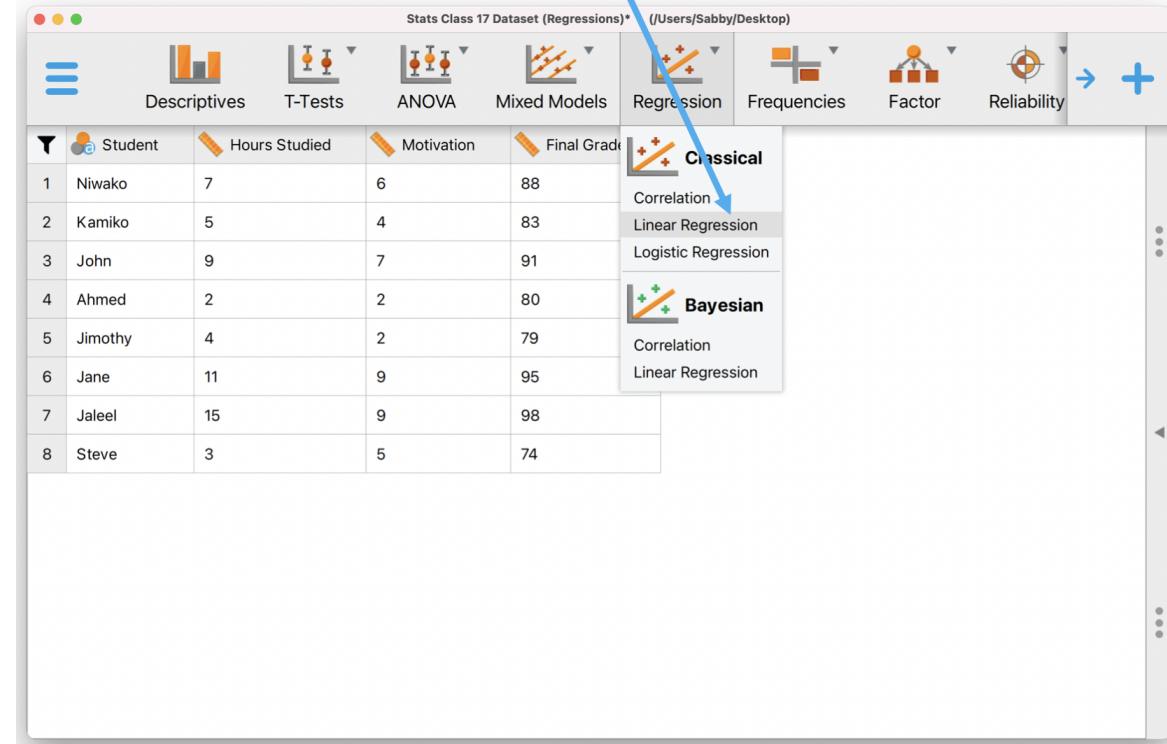
Note. The intercept model is omitted, as no meaningful information can be shown.

Coefficients

Model	Unstandardized	Standard Error	Standardized	t	p
H ₀ (Intercept)	86.00	2.96		29.01	< .001
H ₁ (Intercept)	73.47	2.00		36.77	< .001
	Hours Studied	1.79	0.25	7.29	< .001

JASP: Linear Regression

Now let's do a multiple regression to assess the relative strength at which *both* of our variables predict Final Grade.



The screenshot shows the JASP software interface with the title bar "Stats Class 17 Dataset (Regressions) (/Users/Sabby/Desktop)". The top menu bar includes Descriptives, T-Tests, ANOVA, Mixed Models, Regression, Frequencies, Factor, and Reliability. The Regression icon is highlighted. A dropdown menu for "Regression" is open, showing three options: Classical, Bayesian, Correlation, and Linear Regression. The "Classical" option is currently selected. Below the menu is a table with 8 rows of data:

	Student	Hours Studied	Motivation	Final Grade
1	Niwako	7	6	88
2	Kamiko	5	4	83
3	John	9	7	91
4	Ahmed	2	2	80
5	Jimothy	4	2	79
6	Jane	11	9	95
7	Jaleel	15	9	98
8	Steve	3	5	74

JASP: Linear Regression

Place Final Grade in the “Dependent Variable” box and *both* of our predictors (Hours Studied *and* Motivation) in the “Covariates” box.

The screenshot shows the JASP software interface for a linear regression analysis. The top menu bar includes Descriptives, T-Tests, ANOVA, Mixed Models, Regression, Frequencies, Factor, and Reliability. The Regression icon is highlighted. The main window has a left sidebar with a tree view showing two 'Linear Regression' nodes, with the bottom one expanded to show 'Student'. The main panel contains the following fields:

- Dependent Variable:** Final Grade
- Method:** Enter
- Covariates:** Hours Studied, Motivation
- WLS Weights (optional):** An empty input field.

The right side of the interface displays the results of the linear regression analysis:

Model Summary - Final Grade	
Model	R
H ₀	0.00
H ₁	0.95

ANOVA	
Model	
H ₁	Regression
	Residual
	Total

Note: The intercept model is not significant.

JASP: Linear Regression

And that's it! Notice that R^2 hasn't changed, so adding Motivation hasn't improved our predictive power. Studying matters more!

The screenshot shows the JASP interface for a linear regression analysis titled "Linear Regression". The top menu bar displays the title "Stats Class 17 Dataset (Regressions)*" and the path "(/Users/Sabby/Desktop)". The toolbar above the results includes icons for Descriptives, T-Tests, ANOVA, Mixed Models, Regression (highlighted), Frequencies, Factor, and Reliability.

Model Summary - Final Grade

Model	R	R ²	Adjusted R ²	RMSE
H ₀	0.00	0.00	0.00	8.38
H ₁	0.95	0.90	0.86	3.15

ANOVA

Model	Sum of Squares	df	Mean Square	F	p
H ₁ Regression	442.36	2	221.18	22.28	3.23e-3
Residual	49.64	5	9.93		
Total	492.00	7			

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

Coefficients

Model	Unstandardized	Standard Error	Standardized	t	p
H ₀ (Intercept)	86.00	2.96		29.01	< .001
H ₁ (Intercept)	73.72	2.67		27.56	< .001
Hours Studied	1.88	0.63	1.00	3.01	0.03
Motivation	-0.16	1.00	-0.05	-0.16	0.88

Next time

Lecture

- Analyzing data using JASP I

Reading

- Chapter 16

Quiz 6

- Due Wednesday 3/2/2022 11:59pm
MT
- Covers Ch.15-16

