Welcome and Review

Stat 230: Applied Regression Analysis

PDF version of slides

Welcome 👋

- I’m Adam (he/him)
- I teach statistics & data science
- I’m interested in statistics education, data visualization, and R programming

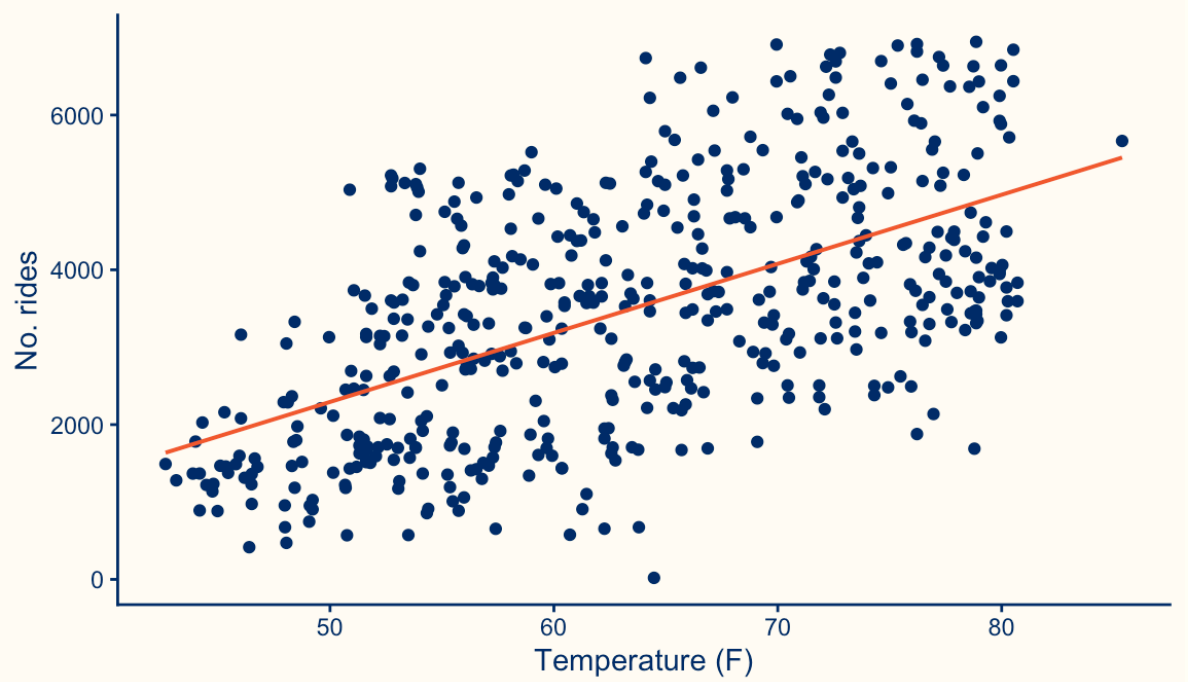
Your turn

- Form groups based on value (2, 3, 4…) of the card dealt
- Introduce yourself to your group
- Share at least one thing other than just your name and major

Hi, I’m Emerson 👋

Simple Linear Regression Review

Regression in intro



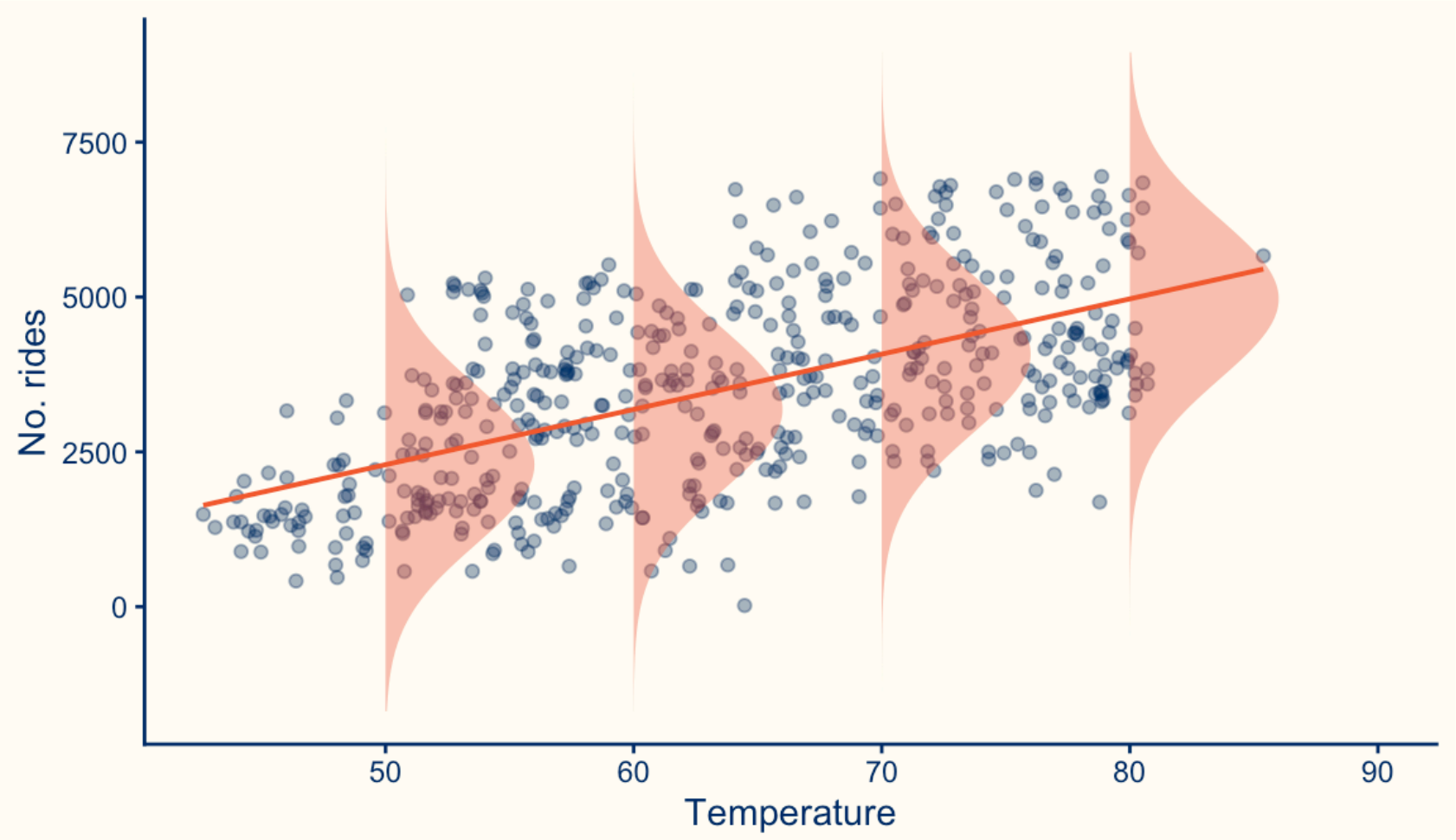
- Describe the scatterplot
- Write the equation of the regression line
- Interpret the slope and intercept
- Make a prediction

Your turn

- Work with your group
- If your card's suit is clubs, you're the designated speaker for your group (be ready!)
- Work through the review questions
- Write your group's answer to each question on the whiteboard

Regression in Stat 230

$$y_i = \beta_0 + \beta_1 x_i + \varepsilon_i \text{ where } \varepsilon_i \overset{\text{iid}}{\sim} N(0, \sigma^2)$$



Simple Linear Regression Model

$$y_i = \beta_0 + \beta_1 x_i + \varepsilon_i \text{ where } \varepsilon_i \overset{\text{iid}}{\sim} N(0, \sigma^2)$$

- Linear relationship between x and y
- Errors are independent and identically distributed (iid)
- Errors are normally distributed
- Errors have mean 0
- Variance of the errors doesn't depend on x

Notation

Mean function:

$$E(Y|X) = \mu\{Y|X\} = \beta_0 + \beta_1 x_i$$

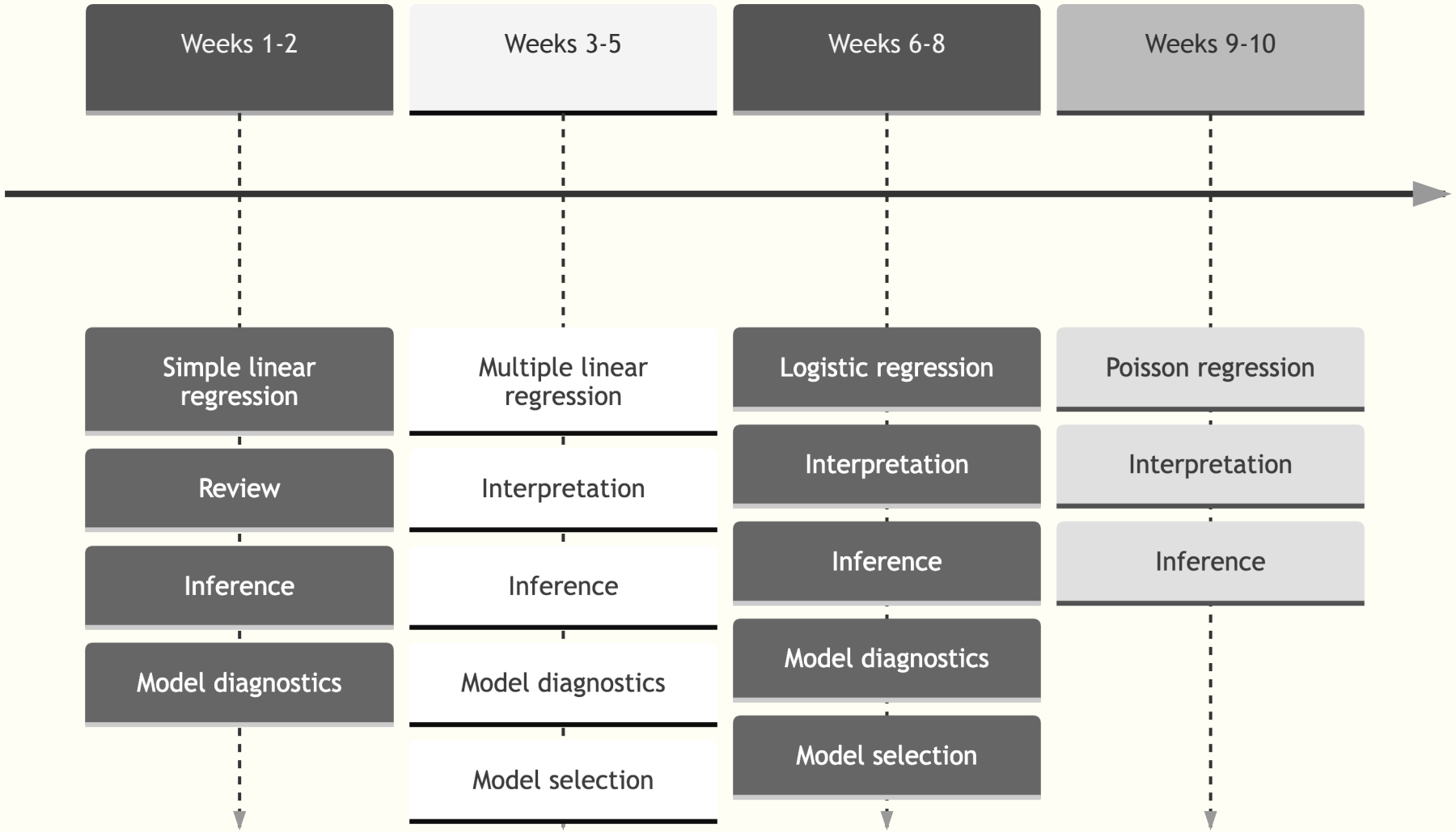
Fitted model equation:

$$\hat{y}_i = \widehat{\mu}\{Y|X\} = \hat{\beta}_0 + \hat{\beta}_1 x_i$$

Overview of Stat 230

Overview of the term

Goal: Develop models to answer research questions


Weeks 1-2
Weeks 3-5
Weeks 6-8
Weeks 9-10
Simple linear regression
Review
Inference
Model diagnostics
Multiple linear regression
Interpretation
Inference
Model diagnostics
Model selection
Logistic regression
Interpretation
Inference
Model diagnostics
Model selection
Poisson regression
Interpretation
Inference

Typical week

Monday

- Pre-class reading/video
- Reflection questions
- Class meeting
- Work on problems

Wednesday

- Pre-class reading/video
- Reflection questions
- Class meeting
- Work on problems

Friday

- Pre-class reading/video
- Reflection questions
- Homework due by the start of class
- Class meeting
- Work on problems

Tools

Moodle	Class website; look here for all materials, links, etc.
Gradescope	Submit assignments, get feedback
R and RStudio	Our computational engine
R Markdown	Dynamic documents for assignments, case studies, projects

Before next class…

1. Explore the Moodle page
2. Read the syllabus – if you have questions, ask them on the syllabus!
3. Review hypothesis tests and confidence intervals as necessary (the basic ideas)
4. Read section 7.4 of Sleuth
5. Complete the pre-class questions (bring your answers to class)