V39 - Multiple Linear Regression - Part 1

- Introduction to Multiple Linear Regression
- Multicollinearity

Course: Statistical Testing & Regression
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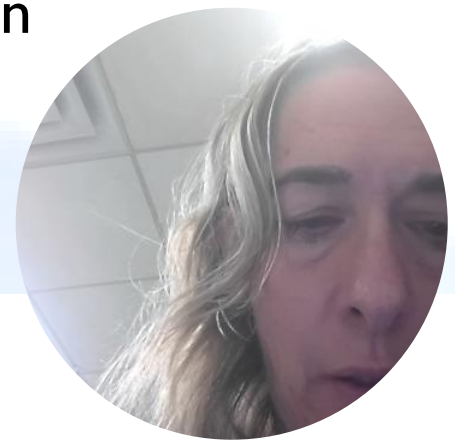
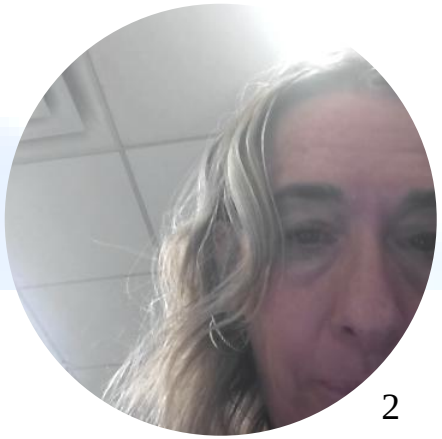


Regression Analysis

- Simple Linear Regression
  - _____ independent variable
  - Need a foundation!
  - Reasonable at times
- Many scientific problems or real-world applications tend to be more complex
  - Require more than _____ independent variable to explain variation & make good predictions
    - _____ **regression model**
    - > _____ independent variable



Multiple Linear Regression Model

$$y = \beta_0 + \beta_1 x + \varepsilon$$

$$y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \ldots + \beta_k x_k + \varepsilon$$

$$\varepsilon \sim N\left(0, \sigma^2\right)$$

- Each β_i estimated via Least Squares Method → obtain b_i's

Multicollinearity

- **Multicollinearity** refers to presence of linear relationships between *independent variables*

$$y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \ldots + \beta_k x_k + \varepsilon$$

- Investigate **multicollinearity** via _____

Multicollinearity

Correlation matrix for *4 independent variables: x1, x2, x3, x4*

Correlation: x1, x2, x3, x4

	x1	x2	x3
x2	0.952		
	0.000		
x3	0.534	0.263	
	0.139	0.495	
x4	0.390	0.155	0.784
	0.299	0.691	0.012

Cell Contents: Pearson correlation
P-Value

Substantial correlations ($p < 0.05$):

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