Welcome back from Study Break, Section 2! (16 November)

Before the Study Break, we recast SLR in a matrix framework: $\mathbf{Y} = \mathbf{X}\beta + \mathbf{e}$

$$\mathbf{Y} = \begin{pmatrix} Y_1 \\ Y_2 \\ \vdots \\ Y_n \end{pmatrix}, \qquad \mathbf{X} = \begin{pmatrix} 1 & X_1 \\ 1 & X_2 \\ \vdots & \vdots \\ 1 & X_n \end{pmatrix}, \qquad \beta = \begin{pmatrix} \beta_0 \\ \beta_1 \end{pmatrix}, \qquad \mathbf{e} = \begin{pmatrix} e_1 \\ e_2 \\ \vdots \\ e_n \end{pmatrix}$$

Setting the derivative of RSS(β) to zero yielded $\hat{\beta} = (\mathbf{X}'\mathbf{X})^{-1}\mathbf{X}'\mathbf{Y}$ when rank($\mathbf{X}$) $= 2$.

We'd wanted to confirm that $\hat{\beta}$ matched our SLR work *without* matrices. This took us to slide 9 of the Weeks 8–9 content, in which we showed $\mathrm{E}(\hat{\beta}) = \beta$. Continuing, let's check the variances and covariances on that slide, and see the slides following it.

After that, tonight's lecture is associated with the content in Portal under *Weeks 9–10*.