Exercício 25

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Item (a)

$$\hat{y}' = \beta_0 + \beta_1 x' = -0.311 + (0.00143)(500) = 0.4$$

$$\bar{x} = \frac{\sum x_i}{n} = \frac{6130}{13} = 471.54$$

$$S_{xx} = \sum x_i^2 - \frac{(\sum x_i)^2}{n} = 3022050 - \frac{(6130)^2}{13} = 131519.23$$

$$S_{yy} = \sum y_i^2 - \frac{(\sum y_i)^2}{n} = 2.1785 - \frac{(4.73)^2}{13} = 0.4575$$

$$S_{xy} = \sum x_i y_i - \frac{\sum x_i \cdot \sum y_i}{n} = 2418.74 - \frac{6130 \times 4.73}{13} = 188.363$$

$$S_R = \sqrt{\frac{S_{yy} - \beta_1 S_{xy}}{n-2}} = \sqrt{\frac{0.4575 - (0.00143)(188.363)}{13-2}} = 0.131$$

$$S_{\hat{y}'} = S_R \sqrt{\frac{1}{n} + \frac{(x' - \bar{x})^2}{S_{xx}}} = 0.131 \sqrt{\frac{1}{13} + \frac{(500 - 471.54)^2}{131519.23}} = 0.0378$$

$$IC = \hat{y}' \pm t_{0.025,11} \cdot S_{\hat{y}'} = 0.4 \pm 2.21 \times 0.0378 = 0.4 \pm 0.08 \Rightarrow \boxed{IC = [0.32; 0.48]}$$

Item (b)

A amplitude do intervalo de confiança em $x = 400$ será maior do que em $x = 500$, pois $x = 400$ está ainda mais longe da média ($\bar{x} = 471.54$) do que $x = 500$.