Guide to Simple Linear Regression

Step 1: Hypothesize the model:

$$E(y) = \beta_0 + \beta_1 x$$

Step 2: Estimate the β's

(Method of least squares)

Step 3: Assumptions on random error, ε

1) Mean $(\varepsilon) = 0$
2) $\text{Var}(\varepsilon) = \sigma^2$ is constant
3) ε has a normal distribution
4) ε's are independent

Step 4: Assess model adequacy

Test for zero slope: $H_0: \beta_1 = 0$
and/or
Confidence interval for slope, β_1

(Reject $H_0: \beta_1 = 0$ or
CI for β_1 does not include 0)
Model statistically useful

(Fail to reject $H_0: \beta_1 = 0$ or
CI for β_1 includes 0)
Model not statistically useful

Reformulate the model
(Return to Step 1)

Examine 2s and r^2

2s is "large" or r^2 is "small"
Model not practically useful

2s is "small" and r^2 is "large"

Step 5: Estimation and/or prediction:

Confidence interval for $E(y)$ given x

Prediction interval for y given x