

- ▶ We can fit the quadratic model:

$$\text{MPG} = \beta_0 + \beta_1 \text{horsepower} + \beta_2 \text{horsepower}^2 + \varepsilon$$

- ▶ But would the model only with linear term suffice?

$$\text{MPG} = \beta_0 + \beta_1 \text{horsepower} + \varepsilon$$

- ▶ Intuitively: is the reduction of RSS afforded by the “complex” model substantial enough in order to justify its use instead of a simpler model?

- ▶ In this case, $n = 392$, $p = 3$, $q = 2$ and

$$RSS(\hat{\beta}) = 7442, \quad RSS(\hat{\beta}_1) = 9385.9$$

yielding

$$\tau = \frac{(9385.9 - 7442)/(3 - 2)}{7442/(392 - 3)} = 101.6$$

- ▶ $p = \mathbb{P}[F_{1,389} \geq 101.6] = 2.2 \times 10^{-21}$, so we reject the hypothesis $H_0 : \beta_2 = 0$.