

Worksheet polynomial/
2-8-07 dummy variables

1. On the polynomial regression example, what is the fitted quadratic regression equation for just x_1 ?

$$\hat{y} = 805.91667 - 1307.08333x_1 + 650x_1^2$$

2. What is the estimate for the mean y when $x_1 = 0.5$? $\hat{y} = 805.91667 - 1307.08333(0.5) + 650(0.5)^2 = 314.875005$

3. Test if a quadratic term is helpful in the model $y = B_0 + B_1x_1 + B_2x_1^2 + \epsilon$

$$H_0: \underline{B_2 = 0} \quad t = \underline{3.41} \quad df = \underline{9}$$

$$H_A: \underline{B_2 \neq 0} \quad p = \underline{0.0077}$$

There (is) is not) sufficient evidence to suggest a quadratic term is helpful to estimate y .

4. In the full model $y = B_0 + B_1x_1 + B_2x_2 + B_3x_1^2 + B_4x_2^2 + B_5x_1x_2 + \epsilon$, test that the predictors x_1^2 , x_2^2 , and x_1x_2 predictors are all not helpful in the model $= 5.664182517$

$$H_0: \underline{B_3 = B_4 = B_5 = 0} \quad F = \frac{(43267 - 2778.83333)}{5-2} / 2382.70139 \quad df(\underline{3}, \underline{6})$$

$$H_A: \underline{\text{Not } H_0} \quad (p \leq 0.05) \text{ or } (p > 0.05)$$

There (is) is not) sufficient evidence to suggest at least one of the predictors x_1^2 , x_2^2 , x_1x_2 are helpful in the model.

5. In the stock size cross example,

What is the fitted regression equation for stocks?

$$\hat{y} = 33.87407 - 0.10174 \text{size} + 8.05547(1) = 41.92954 - 0.10174 \text{size}$$

6. What is the fitted reg. eqn. for those that are not stocks?

$$\hat{y} = 33.87407 - 0.10174 \text{size} + 8.05547(0) = 33.87407 - 0.10174 \text{size}$$

7. Give a 95% confidence interval for the difference between stocks and non stocks for all sizes of firms

$$\left(\frac{8.05547}{4.97703}, \frac{2.110}{11.13391} \right) \uparrow \text{Use model } Y = \beta_0 + \beta_1 \text{size} + \beta_2 \text{stock} + \epsilon$$

8. Is there significant interaction between size and stock type? (yes no)

$$Y = \beta_0 + \beta_1 \text{size} + \beta_2 \text{stock} + \beta_3 \text{size} * \text{stock} + \epsilon$$

9. Give the estimate of the mean y when

size = 100 and type = stock. $\hat{y} = 41.92954 - 0.10174(100) = 31.75554$

10. Give the estimate of the mean y when

size = 100 and type = not stock. $\hat{y} = 33.87407 - 0.10174(100) = 23.70007$

11. On the salary data.

Give the fitted equation for females

$$\hat{y} = 49.44493 + 1.23478 \text{yrs} - 0.87159(1) - 0.26478 \text{yrs}(1) = 48.57334 + 0.97 \text{yrs}$$

Give the fitted equation for males

$$\hat{y} = 49.44493 + 1.23478 \text{yrs} - 0.87159(0) - 0.26478 \text{yrs}(0) = 49.44493 + 1.23478 \text{yrs}$$

12. Is there significant interaction between yrs experience and gender? (yes no)