

STAT 320 Test 2

Linear Regression

March 15, 2005

Practice on Test 2

Data: **Bank**

The data in Table: Harris, show the values of the following variables for **40** employees of a Bank :

Salary: beginning salary per month

Degree: education in years (x_1) stated in categories:

0: high school

1: M.S.

2: Ph.D

Exper: past experiences in months (x_2)

Time: number of months that the individual was hired (x_3)

gender: 0: female, 1: male (x_4)

Use your JMP output to answer the following questions:

1. What is the estimated regression equation relating y to x_1 , x_2 , x_3 and x_4
2. Conduct the overall fit of the regression. Use 5% level of significance . State the hypotheses to be tested, the decision rule, the test statistics, and your decision. What conclusion can be drawn from the result of the test?
3. Interpret the coefficient of regression related to x_4 .
4. Discuss the other coefficients of the regression. Your conclusion
5. Calculate the extra money an employer will earn when he/she get a M.S. (baseline is: high school)
6. Calculate the extra money an employer will earn when he/she get a Ph.D. (baseline is: high school)
7. An analyst believes that x_3 is not important to predict y ? Test this hypothesis with $\alpha = 5\%$ and state your conclusion.

8. Is x_2 linearly related to y (after taking into account the effect of x_1, x_3 and x_4)? Why?
9. What percentage of the variation in y has been explained by the regression.
10. Provide the **95%** Confidence interval of the predicted response mean of y for $x_4 = 1$, $x_1 = 1$, $x_2 = 100$ and $x_3 = 30$
11. It seems that the reduced model

$$y = \beta_0 + \beta_2 x_2 + \beta_3 x_3 + e$$

is relatively adequate to predict y . Test the reduced model versus the Full model. Conclusion

12. Now let's consider the model with the interaction term

$$y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + \beta_{12} x_1 x_2 + e$$

Check if the interaction term $x_1 x_2$ is important to predict y .