

Worksheet Chapter 12
Fall
Biostat 1

Key for Regression worksheet
Muscle Mass 12/5/08

Perform the appropriate regression analysis on problem 1.27, the 'muscle mass' data set to answer the following questions.

1. What is the estimated regression function for this data?

$$\widehat{\text{muscle mass}} = 148 - 1.02359(\text{age})$$

2. What is your point estimate for the difference in muscle mass for women differing in age by one year? _____ $\hat{b}_1 = -1.02359$ (1.02359 units lower)

3. What is your point estimate for the mean muscle mass of a woman aged 61?

$$\underline{85.612} \quad 148 - 1.02359(61) = 85.612$$

4. What is your estimate for the variance? $\underline{69.61829}$ Mse

5. What is the value of R-squared for this regression? $\underline{0.6788}$

67.88% of the variation in M. mass is explained by the model

6. Set up and obtain a 95% CI on β_1 . $\underline{-1.02359} \pm \underline{2.145} \quad \underline{0.18818}$

$$(\underline{-1.42720}, \underline{-0.61998})$$

7. Test whether a linear association exists between age and muscle mass.

$$H_0: \beta_1 = 0$$

$$H_a: \beta_1 \neq 0$$

$$\text{Test statistic} = \underline{t = -5.44} \quad \text{df} = \underline{14} \quad \text{P-value} = \underline{20.0001}$$

Conclusion:

There is evidence to suggest that the slope is non zero which implies that there is an association of muscle mass and age

8. What is the estimate of the mean muscle mass of a woman aged 61? $\underline{85.612}$

9. What is the estimate of the mean muscle mass of a woman aged 41? $\underline{106.084}$

$$148 - 1.02359(41) \uparrow$$

10. What is the estimate for the correlation between muscle mass and age? $\underline{-0.8239}$

The square root of R^2 and place the sign of the slope in front.

$$\text{Since the slope is negative} \quad R^2 = 0.6788 \quad \sqrt{0.6788} = 0.8239$$

$$r = -0.8239$$