**Stats 201 HW2**

1.27



a. It appears to be a good fit showing that the muscle mass decreases with age.

b. (1) -1.1900 (2) 84.94863 (3) 4.443252 (4) 66.80082 (all from R output)

2.9

s{ŷ} is different for each X values, but s{b1} is the same for all X values.

2.10

a. Prediction interval. We are using data in the past to predict a new observation tomorrow, not the mean for all days with the same temperature.

b. Confidence interval. We want to get the average value, not to predict a new observation, so we can use the data we have to get a confidence interval of the mean.

c. Prediction interval. We are using data in the past to predict a new observation for the next month.

2.28

a. Point estimate = 84.94683, lower = 82.83471, upper = 87.05895. It means that we have 95% confidence that the mean muscle mass of women with age 60 for the population is between 82.83471 and 87.05895.

b. Point estimate = 84.94683, lower = 68.45067, upper = 101.443. It is NOT relatively precise than the confidence interval because we are making a prediction for a new observation and the range of possible values will be wider.

2.12

σ2{pred} cannot be brought to zero, but σ2{Ŷh} can. It means that if we have more data as n goes large, we can predict the mean of X values really well. However, even if we have a lot of data to build the model, we might still have errors when predicting a new observation because the value is within a range, not a single value.

2.27

a.

1) Null hypothesis H0: β1 = 0, alternative hypothesis H1: β1 < 0.

2) Decision rule: if P-value < 0.05, reject the null hypothesis.

3) P-value = 10-16 (from R output)

4) Decision: reject H0.

5) Conclusion: there is a strong evidence to believe that there is a negative linear relationship between the amount of muscle mass and age.

b. No. The data we use to build the model has only the muscle mass of women from age 41 to age 78, so we cannot conclude the muscle mass of women at birth.

c. From the output of R, we know the point estimate of the slope is -1.99, and the standard error is 0.0902, so we can get a 95% confidence interval (-1.370545, -1.009446). Since we only use the point estimate and standard error to calculate the confidence interval, and they don’t change as x changes, we don’t have to have a specific x value to get the confidence interval.