SAS

Polynomial Regression

2nd order for all:

1. *head to mass*
   $R^2 = 0.06$

2. *chest to mass*
   $R^2 = 0.60$

3. *forearm to mass*
   $R^2 = 0.83$

4. *shoulder to mass*
   $R^2 = 0.76$

5. *thigh to mass*
   $R^2 = 0.729$

The head polynomial model was by far the worst predictor of mass. We found forearm to be the best, followed closely by shoulder and thigh. The type 1 sum of squares shows that the second order variable explained less of the mass than the first order variable, as it was significantly lower in all of the parameters we tried.

Multiple Regression

1. *height, chest, and head*
   $R^2 = 0.74$

Variable	**Type II Sum of Squares**
Height	312.24
Chest	1174.35
Head	43.29

2. *chest, calf, and height*
   $R^2 = 0.83$

Variable	Type II Sum of Squares
Chest	272.85
Calf	281.92
Height	101.37

3. *chest, calf, height, and forearm*
   $R^2 = 0.88$

Variable	Type II Sum of Squares
Chest	54.57
Calf	40.84
Height	74.53
Forearm	131.94

4. *forearm, height, and chest*
   $R^2 = 0.87$

Variable	Type II Sum of Squares
Forearm	373.03
Height	104.14
Chest	62.70

5. *forearm, height, and waist*
   $R^2 = 0.96$

Variable	Type I Sum of Squares	Type II Sum of Squares
Forearm	2038.88	214.67
Height	87.41	48.39

Waist	285.70	285.70

6. *forearm, waist, and height*
   $R^2 = 0.96$

Variable	**Type I Sum of Squares**	**Type II Sum of Squares**
Forearm	2038.88	214.67
Waist	324.73	285.70
Height	48.39	48.39

Tubbs Example: forearm, waist, and thigh
$R^2 = 0.95$

Variable	**Type II Sum of Squares**
Forearm	121.68
Waist	228.20
Thigh	23.45

!-6 outlines our process of adding and removing different parameters to our multiple regression model. We found forearm, waist, and height to be the best parameters to include in our multiple regression model. It had an R^2 value of 0.96. We tried different orders of the variables to see if that had an effect on the sums of squares. We found that the Type I Sum of Squares was larger for waist when it was second rather than third in the model.
In 3 we created a model using four parameters, but decided to move forward with only three due to the low type II sums of squares and the inability to sufficiently compare models with different amounts of variables. We also did not want to over explain the model and therefore stuck with three variables.