Relationships Between Body Parts

The following is an excerpt from Jonathan Swifts, Gulliver's Travels.

"The seamstresses took my measure as I lay on the ground, one standing at my neck and the other at my mid-leg, with a strong cord extended, that each held by an end, while the third measured the cord with a rule an inch long. Then they measured my right thumb, and desired no more; for by a mathematical computation, that twice round the thumb is once round the wrist, and to on to the neck and waist and by the help of my old shirt, which I displayed on the ground before them for a pattern, they fitted me exactly."

Today's lab will focus on finding mathematical relationships between body parts.

Problem 1:

Without taking any measurements, can you make a conjecture regarding the relationship between the length of one's ulna and the length of his/her shoe?

Begin by measuring the length of each person's ulna and shoe. Be careful to be *very precise* when making these measurements. Keep the male data separate from the female data. Make one table that represents each female in your groups' ulna and shoe measurement, and another table that represents each male in your groups' ulna and shoe measurement.

Include in these tables results from a all of the other groups.

Make two scatter plots - one that corresponds to the male data and the other that corresponds to the female data. Be sure your plots contain a well- labeled set of axes. Based on the scatter plots, can you guess a relationship between the length of one's shoe?

Think of the length of your shoe as a function of the length of your ulna. What is an *appropriate* domain and range? Calculate the best-fit linear models for the male and female data. Call these the **"experimental models"** .

Note the value of the correlation coefficient for each and interpret in each case.

Based on the experimental model, what do you deduce is the mathematical relationship between the length of his/her ulna?

The length of my ulna is inches. Predict the length of my shoe.

Problem 2:

A person stands with his/her arms straight out so that his/her body forms the latter T. Call the distance from his/her fingertip to his/her fingertip the person's wingspan. Is there a mathematical relationship between a person's wingspan and his/her height? Without taking measurements can you guess a relationship?

Begin by taking the appropriate measurements. (Again be very precise when measuring.)
This time we will not separate the male data from the female data. Include a all other groups' data with your own.

Similarly as you did in problem 1, find an experimental model that relates a person's wingspan to their height.

Use the fact that my wingspan is inches to predict my height.