Algebra 1   Name_____
Upper and Lower Bounds AND Residuals

In 1997, an anthropologist discovered an early humanoid in Europe. As part of the analysis of the specimen, the anthropologist needed to determine the approximate height of the individual. The skeletal remains were highly limited, with only an ulna bone (forearm) being complete. The bone measured 26.4 cm in length.

The anthropologists decided one way to determine how tall the humanoid could be was to collect data from humans today comparing the length of their ulna bone to their height. Below is the data collected in the experiment and a scatter plot representing the data with a line of best fit.
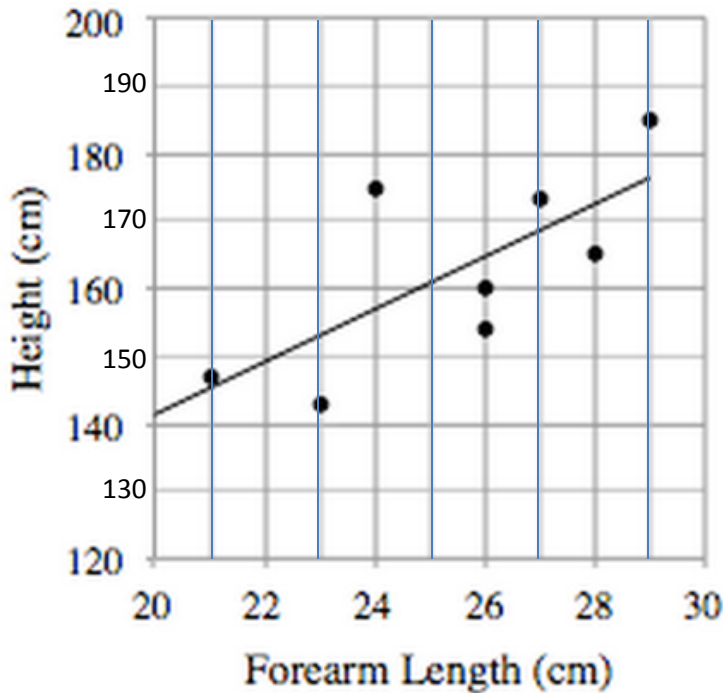
Forearm Length (cm)	Height (cm)
23	143
26	160
27	173
24	175
28	165
26	154
29	185
21	147

1. Find the equation for the line of best fit (*use h in place for y and f in place for x*).

2. Interpret the slope **AND** y-intercept in this problem.

3. What is the predicted height of the humanoid whose ulna was found? The bone measured 26.4 cm in length.

4. Because the height you found for the humanoid is a prediction, the actual height of the early humanoid was probably a little shorter or a little taller. In this problem, you will investigate how you can report a range of values for your prediction of the humanoid's height.

1) Analyze the scatter plot. Identify the point on the scatterplot that is **<u>above the line of best fit and farthest away from the line of best fit</u>**. What is this coordinate point?
   a. Draw a HORIZONTAL line from the coordinate point to the line of best fit. We call this distance the **residual**. A residual is a measure of how far a prediction is from what is actually observed.

$$\text{residual} = \text{actual} - \text{predicted}$$

   What is the coordinate point of the predicted (on your line of best fit) ulna length and height? Use your equation for the line of best fit to find this. Plug in the x value into your equation, the same x value from the point for which you are trying to find the residual.
   b. Now subtract this y value FROM the y value of the data point you are finding the residual for.
   c. Repeat for all points