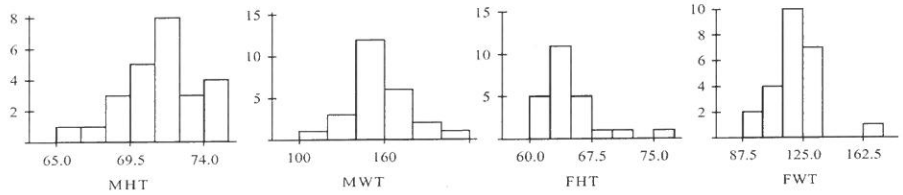
Chapters 7, 8 – Class Activity Key – Correlation, Regression, and Prediction

1. Enter the data, or collect data from your own class, provided you have enough students to make meaningful summaries.

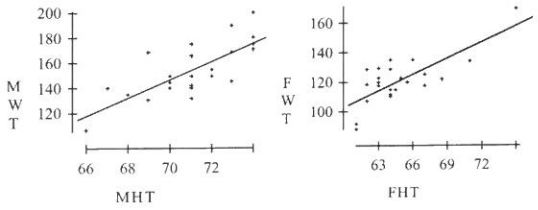
2. 

MHT	MWT	FHT	FWT
Mean = 70.96 in Median = 71 in	Mean = 153.6 lbs Median = 150 lbs	Mean = 64.73 in Median = 64 in	Mean = 120.6 lbs Median = 120 lbs

All of the distributions are at least roughly unimodal and symmetric. There are several tall females, one of which is also heavier than average. Since the means and medians are roughly the same, it seems reasonable that these data are drawn from populations that are normally distributed.

3a. The explanatory variable is height. Height determines weight.

3b. There is a moderate, positive linear relationship between male height and male weight. Taller males are generally heavier. Likewise, there is a moderate, positive, linear relationship between female height and female weight. Taller females are generally heavier. There is one female who is much taller and heavier than the others, but this female's attributes fit the overall pattern, although her weight is a bit higher than we would expect, based on the overall relationship.



4a. Males : $r = 0.752$ Females : $r = 0.738$

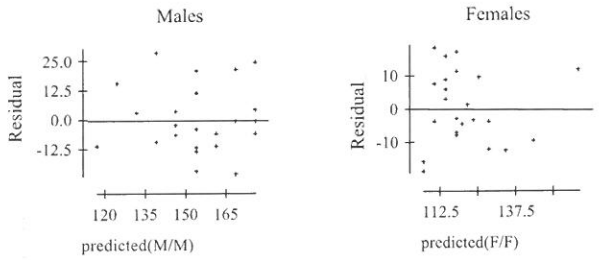
4b. Someone of average height is expected to be of average weight.
A male 2 standard deviations above the mean in height is expected to be 2(0.752) = 1.54 standard deviations above the mean in weight.
A female 1 standard deviation below the mean height is expected to be 1(0.738) = 0.738 standard deviations below the mean in weight.

4c. The relationship between height and weight is not perfect. When making predictions, we are cautious when straying too far away from the mean, because of this variability. When we back off in our predictions by multiplying standard deviations by r, we are regressing towards the mean.

4d. 56.5% of the variability in Male Weight is explained by the linear model.
54.5% of the variability in Female Weight is explained by the linear model.

5a. $\hat{MWT} = -364.403 + 7.29993(MHT)$ $\hat{FWT} = -116.574 + 3.66384(FHT)$

5b.



Both residuals plots appear reasonably scattered. The linear models are both appropriate, although removing the heaviest and two lightest females may yield a better overall model.

5c. According to the linear models, each additional inch in male height is associated with about 7.3 additional pounds in weight, and each additional inch in female height is associated with about 3.7 additional pounds in weight.

5d. 60" male: 73.6 lbs 60" female: 103.3 lbs 70" male: 146.6 lbs 70" female: 139.9 lbs.

5e. 7'2" male: 263.4 lbs 20" newborn baby girl: – 43.3 lbs
The weight of the male seems low. A male this tall would weigh much more. The weight of the newborn baby girl is impossible. These models were designed to predict the weights of typical high school students, not the very tall or babies. We wouldn't expect these predictions to be accurate.