Observation = Model + Residual

1. Explanatory variable: $x$  Response variable: $y$  predicted response: $\hat{y}$.

2. The equation of the least-squares regression line is

$$\hat{z}_y = r z_x \left( \frac{\hat{y} - \bar{y}}{s_y} \right) = r \left( \frac{x - \bar{x}}{s_x} \right) \quad \hat{y} = \left( \bar{y} - r \frac{s_y}{s_x} \bar{x} \right) + \left( r \frac{s_y}{s_x} \right) x$$

3. Interpretation: predict that $y$ will be $r$ standard deviations for each standard deviation $x$ is above the mean. (If $x = \bar{x}$, predict $\hat{y} = \bar{y}$).

4. Regression “explains” variation.

5. $r^2$ as percentage of variation explained.

6. Why is it called regression?

7. Information from residuals.

Useful R

```
> Plot(Hand~Height)
> l=lm(Hand~Height)
> abline(l)
> abline(h = mean(Hand))
> abline(v = mean(Height))
> plot(residuals(l)^fitted(l))
```

Homework

1. Read Chapter 8, 193–200.

2. Practice problems (due Monday, February 22) 7,9,11

3. Problems to turn in (due Tuesday, February 23) 46