Economics 250
Covariance

The covariance is an intermediate step in calculating the correlation. For sample data (in chapter 3), the covariance is:

$$s_{xy} = \frac{1}{n-1} \sum_{i=1}^{n} (x_i - \overline{x})(y_i - \overline{y}).$$

If you check the formula for the correlation (on page 93 of the textbook) you will see that this is just a building block of that formula. Thus,

$$r_{xy} = \frac{s_{xy}}{s_x s_y}.$$

For two random variables (in chapters 4 and 5), the expression for the covariance is:

$$\sigma_{xy} = E(x - \mu_x)(y - \mu_y).$$

Thus,

$$\rho_{xy} = \frac{\sigma_{xy}}{\sigma_x \sigma_y}.$$

Whenever we know the joint probability density of x and y we can calculate σ_{xy} and ρ_{xy}.