EX: If we have the following condition, what is the value of correlation, ρ_{XY}?

$$\sigma_{XY} = \sigma_X \sigma_Y$$

SOL'N: The covariance, σ_{XY}, appears in the numerator of the definition of correlation:

$$\rho_{XY} \equiv \frac{\sigma_{XY}}{\sigma_X \sigma_Y}$$

Substituting for the covariance yields the following:

$$\rho_{XY} \equiv \frac{\sigma_X \sigma_Y}{\sigma_X \sigma_Y} = 1$$

The correlation is equal to one, meaning that X and Y are deterministically related.

This is in contrast to independent random variables that satisfy a similar form of equation for means:

$$\mu_{XY} = \mu_X \mu_Y$$

Note that for independent random variables, the covariance is zero:

$$\sigma_{XY} = 0 \text{ for } X \text{ and } Y \text{ independent}$$