

TOOLS: The table below summarizes the values for means and variances of combinations of random variables.

MEAN (OR EXPECTED VALUE), 2 INDEPENDENT RANDOM VARIABLES

$$E(XY) = E(X)E(Y)$$

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

COVARIANCE, ANY 2 RANDOM VARIABLES

$$\sigma_{XY} = E(XY) - \mu_X \mu_Y = E((X - \mu_X)(Y - \mu_Y)) = \int_{-\infty}^{\infty} \int_{-\infty}^{\infty} xyf(x,y)dydx - \mu_X \mu_Y$$

$$\sigma_{aXbY} = ab\sigma_{XY}$$

COVARIANCE, 2 INDEPENDENT RANDOM VARIABLES

$$\sigma_{XY} = 0$$

CORRELATION, ANY 2 RANDOM VARIABLES

$$\rho_{XY} = \frac{\sigma_{XY}}{\sigma_X \sigma_Y} = \frac{\sigma_{XY}}{\sqrt{\sigma_X^2 \sigma_Y^2}}$$

$$\rho_{aXbY} = \rho_{XY}$$

CORRELATION, 2 INDEPENDENT RANDOM VARIABLES

$$\rho_{XY} = 0$$