

LINEAR COMBINATIONS OF RANDOM VARIABLES

EXPECTED VALUE:

$$E(a_1 X_1 + a_2 X_2 + \dots + a_n X_n + b) = a_1 E(X_1) + a_2 E(X_2) + \dots + a_n E(X_n) + b$$

VARIANCE:

$$\begin{aligned} \text{Var}(a_1 X_1 + a_2 X_2 + \dots + a_n X_n + b) &= \sum_{i=1}^n \sum_{j=1}^n a_i a_j \text{Cov}(X_i, X_j) \\ &= \sum_{i=1}^n a_i^2 \text{Var}(X_i) + 2 \sum_{i < j} a_i a_j \text{Cov}(X_i, X_j) \end{aligned}$$