Definition of IID

We say that a sequence X_1, X_2, \ldots, X_n of random variables is **independent and identically distributed (IID)** if

- They are independent;
- **2** All X_i have the same distribution.

Theorem

Let X_i be IID. Define

$$S_n = X_1 + X_2 + \dots + X_n = \sum_{i=1}^n X_i,$$
$$A_n = S_n/n.$$

Then

$$\mathbb{E}[S_n] = n \cdot \mathbb{E}[X_1], \quad \text{Var}(S_n) = n \text{Var}(X_1),$$
$$\mathbb{E}[A_n] = \mathbb{E}[X_1], \quad \text{Var}(A_n) = \frac{\text{Var}(X_1)}{n}.$$