

CS70 Random Variables II

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Overview

- 1 Covariance
- 2 Correlation
- 3 Markov's Inequality
- 4 Chebyshev's Inequality
- 5 Law of Large Numbers

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$$\mathbb{E}[XY] = \mathbb{E}[X]\mathbb{E}[Y] \implies \text{Cov}(X, Y) = 0.$$

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and $-1 \leq \rho(X, Y) \leq 1$.

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- **Bilinearity:**

$$\text{Cov} \left(\sum_{i=1}^n a_i X_i, \sum_{j=1}^m b_j Y_j \right) = \sum_{i=1}^n \sum_{j=1}^m a_i b_j \text{Cov}(X_i, Y_j).$$

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Problem Time!