

MATH 134A Review: The point estimate for the population variance

1. Let X_1, \dots, X_n be independent and identically distributed (discrete) random variables. Let μ be the expectation of X_1, \dots, X_n and let σ^2 be the variance of X_1, \dots, X_n . Define $\bar{X} := \frac{X_1 + \dots + X_n}{n}$. Prove $\mathbb{E}(\bar{X}) = \mu$.
2. Let X_1, \dots, X_n be independent and identically distributed (discrete) random variables. Let μ be the expectation of X_1, \dots, X_n and let σ^2 be the variance of X_1, \dots, X_n . Define $\bar{X} := \frac{X_1 + \dots + X_n}{n}$. Prove $\text{Var}(\bar{X}) = \frac{\sigma^2}{n}$.