

Math/Stat 370: Engineering Statistics

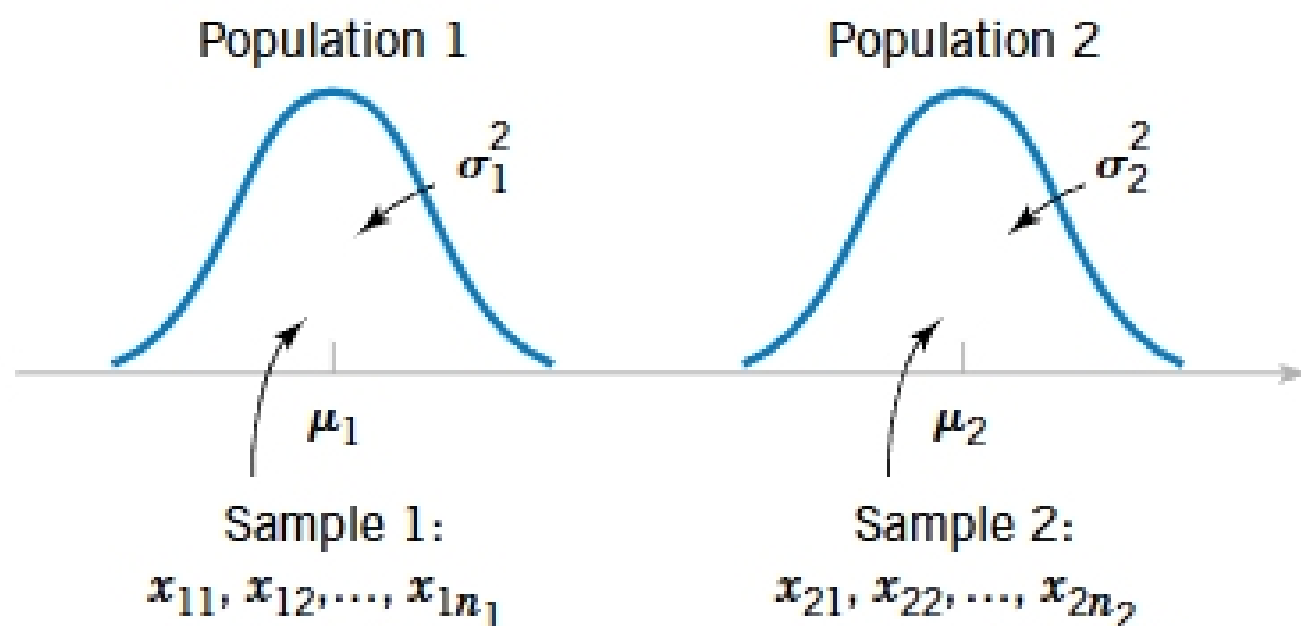
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Week 9

Comparing Means of Two Populations

- Two populations with, respectively, unknown means μ_1 and μ_2 , **known variances σ_1^2 and σ_2^2** .
- Hypotheses: $H_0 : \mu_1 = \mu_2$ VS $H_1 : \mu_1 \neq \mu_2$.
- More general: $H_0 : \mu_1 - \mu_2 = \Delta_0$ VS $H_1 : \mu_1 - \mu_2 \neq \Delta_0$.
- Test the hypotheses with significant level α .
- Take a sample $X_{11}, X_{12}, \dots, X_{1n_1}$ from population 1.
- Take a sample $X_{21}, X_{22}, \dots, X_{2n_2}$ from population 2.
- Two samples are independent.



Test Statistic

- The sample average of the first sample

$$\bar{X}_1 = \frac{\sum_{i=1}^{n_1} X_{1i}}{n_1}.$$

- The sample average of the second sample

$$\bar{X}_2 = \frac{\sum_{i=1}^{n_2} X_{2i}}{n_2}.$$

- $E(\bar{X}_1 - \bar{X}_2) = \mu_1 - \mu_2.$
- $V(\bar{X}_1 - \bar{X}_2) = \frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}.$