

Parametric Tests

Z-Test Question (Population σ known)

Question#1: A company claims that the **average weight of their packaged sugar bags is 1 kg**. From past records, the population standard deviation is known to be **0.05 kg**. A random sample of **36 bags** has a mean weight of **0.985 kg**.

At the **5% significance level**, test whether the company's claim is correct.

Question#2: A factory claims that the average weight of its sugar packets is **1 kg (1000 g)**. The population standard deviation is known to be **20 g**. A sample of **50 packets** is taken, and the sample mean weight is **990 g**.

At the **5% significance level**, test whether the factory's claim is valid.

T-Test Question (Population σ unknown)

Question#1: A teacher claims that the **average exam score** of her class is **75**. A random sample of **10 students** gives the following scores:

68, 74, 72, 70, 78, 80, 69, 73, 77, 71

At the **5% significance level**, test whether the average score is significantly different from 75.

Question#2: A nutritionist claims that the average daily protein intake of adults is **60 g**. A random sample of **12 adults** gives the following intakes (in grams):

58, 62, 65, 59, 55, 61, 64, 57, 63, 60, 56, 62

At the **5% significance level**, test whether the average protein intake is different from 60 g.

(Hint: Use **T-test** because σ is **unknown** and $n = 12$ is **small**.)

One-Way ANOVA Question

A teacher wants to compare the exam scores of students taught using three different teaching methods: **Lecture, Group Discussion, and Online Learning**.

The exam scores (out of 100) are:

- **Lecture:** 78, 85, 82, 88, 75
- **Group Discussion:** 90, 95, 88, 92, 85
- **Online Learning:** 70, 72, 68, 65, 74

At the **5% significance level**, test whether there is a significant difference in mean scores across the three teaching methods.

(Hint: Use **One-Way ANOVA** because there is **one factor** = Teaching Method.)

Two-Way ANOVA Question

A company wants to study the effect of **two factors** on employee productivity:

1. **Work Shift** (Day, Night)
2. **Training Type** (On-site, Online)

The productivity scores of employees are recorded as follows:

Shift	Training	Scores
Day	On-site	75, 80, 78, 82
Day	Online	70, 68, 72, 74
Night	On-site	65, 70, 68, 72
Night	Online	60, 62, 58, 65

At the **5% significance level**, test whether:

- There is a main effect of **Work Shift**.
- There is a main effect of **Training Type**.
- There is an **interaction effect** between Work Shift and Training Type.

(Hint: Use **Two-Way ANOVA** because there are **two factors**.)

Non Parametric Tests

Chi-Square Goodness of Fit

A company claims that the distribution of its customers' preferred payment methods is:

- **Cash = 40%**
- **Credit Card = 35%**
- **Online Payment = 25%**

In a random sample of **200 customers**, the observed preferences were:

- **Cash = 90**
- **Credit Card = 70**
- **Online Payment = 40**

Test at the 5% significance level whether the observed distribution differs from the company's claim.

Chi-Square Test of Independence

A researcher wants to check if **gender** is associated with **preference for a new product**. The survey data is:

	Like Product	Dislike Product
Male	30	20
Female	25	25

Test at the 5% significance level whether **gender and product preference are independent**.