Analysis of Variance (ANOVA)

One Way Classification:

Question 1:

A car manufacturer wants to determine whether the type of engine (Petrol or Diesel) has a **significant effect on car mileage** (in kilometers per liter). A random sample of 10 Petrol engine cars and 10 Diesel engine cars was taken, and their mileage was recorded.

	Car Mileage (km/l)				
Petrol Engine	14.5	15.2	13.9	14.3	15.0
Diesel Engine	18.4	19.1	18.0	17.9	19.3

Test whether there is a significant difference in the **average mileage** between Petrol and Diesel engine cars at a 5% significance level.

Question 2:

A clothing company wants to analyze whether the **sales percentage of a branded shirt** differs significantly across different cities in Tamil Nadu. Sales percentages were recorded from **showrooms located in 4 cities**: Chennai, Coimbatore, Madurai, and Trichy.

A random sample of showrooms from each city was selected, and their sales percentages for the branded shirt were recorded.

	Chennai	Coimbatore	Madurai	Trichy
Peter England	62%	58%	54%	60%
Louis Philippe	65%	60%	52%	61%
Van Heusen	63%	59%	55%	59%
Allen Solly	64%	61%	53%	62%

Test whether there is a significant difference in the **average sales percentage** of the branded shirt among the four cities at a 5% significance level.

Two Way Classification

Question 1:

A fashion analyst wants to study the effect of **online stores** and **kurta brands** on the **selling price** of women's kurtas. Prices (in ₹) of kurtas from **three popular brands** — Max, Avasaa, and Libas — were collected from **four major online platforms**: Amazon, Flipkart, Meesho, and Myntra.

Brand \ Store	Amazon	Flipkart	Meesho	Myntra
Max	799	749	699	819
Avasaa	899	859	799	929
Libas	1199	1099	999	1249

Test the following at a 5% significance level:

a) Whether the **average kurta price differs significantly among brands** (Max, Avasaa, Libas).
b) Whether the **average kurta price differs significantly among online stores** (Amazon, Flipkart, Meesho, Myntra).

Question 2:

A study was conducted to analyze whether **the university of graduation** and the **recruiting MNC** have a significant effect on the **average salary offered** to toppers. Toppers from four reputed universities — **IIT, AU (Anna University), JU (Jadavpur University), and DU (Delhi University)** — were recruited by five top MNCs: **TCS, Microsoft, Google, Amazon, and Apple**.

The annual salary (in **LPA – Lakhs Per Annum**) offered to a sample of toppers from each university by each company was recorded.

University \ MNC	TCS	Microsoft	Google	Amazon	Apple
IIT	12	38	40	36	42
AU	10	28	30	27	32
JU	9	25	27	24	29
DU	8	22	25	21	26

Test at the 5% level of significance:

a) Whether the **average salary differs significantly by university**.
b) Whether the **average salary differs significantly by company**.
c) Whether there is a **significant interaction effect** between **university** and **company**.

Question 3:

A financial analyst wants to determine whether the **type of loan** and the **bank providing it** have a significant impact on the **average EMI tenure (in months)**. Data was collected from four banks — **ICICI, HDFC, AXIS, and IDFC** — for three types of loans: **Housing, Car, and Mobile**.

Loan Type \ Bank	ICICI	HDFC	AXIS	IDFC
Housing Loan	240	228	216	240
Car Loan	84	72	78	80
Mobile Loan	18	12	15	14

Test the following at a 5% significance level:

a) Is there a significant difference in EMI tenure among different **loan types**?
b) Is there a significant difference in EMI tenure among different **banks**?
c) Is there an **interaction effect** between **bank** and **loan type** on EMI tenure?