Indira Gandhi Delhi Technical University For Women

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PROBABILITY AND STATISTICS (LAB) (BAS-103)

WORKSHEET

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IT-2

Group-G

Instructions: **Do all the questions. Upload your file in pdf format only. All the screenshots must be clear.**

Q1. Create a matrix of dimension 3x3 then

(i) add one column

(ii) add one row

(iii) assign the column and row names.

Code :

```
#Mitashi Dua 08201032024 IT-2
# Create a 3x3 matrix
matrix <- matrix(c(1, 2, 3,
                   4, 5, 6,
                   7, 8, 9),
                 nrow=3, ncol=3, byrow=TRUE)

#i) Add one column
new_column <- c(10, 11, 12)
matrix <- cbind(matrix, new_column)
print(matrix)

# ii) Add one row
new_row <- c(13, 14, 15, 16)
matrix <- rbind(matrix, new_row)
print(matrix)

# iii) Assign row and column names
rownames(matrix) <- c("Row1", "Row2", "Row3", "Row4")
colnames(matrix) <- c("Col1", "Col2", "Col3", "Col4")
print(matrix)
```

Output :

```
> #Mitashi Dua 08201032024 IT-2
> # Create a 3x3 matrix
> matrix <- matrix(c(1, 2, 3,
+                    4, 5, 6,
+                    7, 8, 9),
+                  nrow=3, ncol=3, byrow=TRUE)
>
> #i) Add one column
> new_column <- c(10, 11, 12)
> matrix <- cbind(matrix, new_column)
> print(matrix)
           new_column
[1,] 1 2 3         10
[2,] 4 5 6         11
[3,] 7 8 9         12
>
> # ii) Add one row
> new_row <- c(13, 14, 15, 16)
> matrix <- rbind(matrix, new_row)
> print(matrix)
                 new_column
         1  2  3         10
         4  5  6         11
         7  8  9         12
new_row 13 14 15         16
>
> # iii) Assign row and column names
> rownames(matrix) <- c("Row1", "Row2", "Row3", "Row4")
> colnames(matrix) <- c("Col1", "Col2", "Col3", "Col4")
> print(matrix)
     Col1 Col2 Col3 Col4
Row1    1    2    3   10
Row2    4    5    6   11
Row3    7    8    9   12
Row4   13   14   15   16
```

Q2. An entomologist studying morphological variation in species of mosquito recorded the following data on body length:

1.2, 1.4, 1.3, 1.6, 1.0, 1.5, 1.7, 1.1, 1.2, 1.3.

Compute all the measures of dispersion.

Code :

```r
#Mitashi Dua 08201032024 IT-2
# Given data
data <- c(1.2, 1.4, 1.3, 1.6, 1.0, 1.5, 1.7, 1.1, 1.2, 1.3)

# Compute measures of dispersion
range_value <- max(data) - min(data)  # Range
variance_value <- var(data)  # Sample variance
std_dev_value <- sd(data)  # Sample standard deviation
mean_absolute_deviation <- mean(abs(data - mean(data)))  # Mean Absolute Deviation
coefficient_of_variation <- (std_dev_value / mean(data)) * 100  # Coefficient of Variation

# Compute quartiles and interquartile range (IQR)
q1 <- quantile(data, 0.25)
q3 <- quantile(data, 0.75)
iqr_value <- q3 - q1  # Interquartile Range (IQR)

# Print results
cat("Range:", range_value, "\n")
cat("Variance:", variance_value, "\n")
cat("Standard Deviation:", std_dev_value, "\n")
cat("Mean Absolute Deviation:", mean_absolute_deviation, "\n")
cat("Coefficient of Variation (%):", coefficient_of_variation, "\n")
cat("Interquartile Range (IQR):", iqr_value, "\n")
```

Output :

```
> #Mitashi Dua 08201032024 IT-2
> # Given data
> data <- c(1.2, 1.4, 1.3, 1.6, 1.0, 1.5, 1.7, 1.1, 1.2, 1.3)
>
> # Compute measures of dispersion
> range_value <- max(data) - min(data)  # Range
> variance_value <- var(data)  # Sample variance
> std_dev_value <- sd(data)  # Sample standard deviation
> mean_absolute_deviation <- mean(abs(data - mean(data)))  # Mean Absolute Deviation
> coefficient_of_variation <- (std_dev_value / mean(data)) * 100  # Coefficient of Variation
>
> # Compute quartiles and interquartile range (IQR)
> q1 <- quantile(data, 0.25)
> q3 <- quantile(data, 0.75)
> iqr_value <- q3 - q1  # Interquartile Range (IQR)
>
> # Print results
> cat("Range:", range_value, "\n")
Range: 0.7
> cat("Variance:", variance_value, "\n")
Variance: 0.049
> cat("Standard Deviation:", std_dev_value, "\n")
Standard Deviation: 0.2213594
> cat("Mean Absolute Deviation:", mean_absolute_deviation, "\n")
Mean Absolute Deviation: 0.176
> cat("Coefficient of Variation (%):", coefficient_of_variation, "\n")
Coefficient of Variation (%): 16.64357
> cat("Interquartile Range (IQR):", iqr_value, "\n")
Interquartile Range (IQR): 0.275
```

Q3. Create the following dataframe:

	Product_ID	Product_Name	Category	Price	Stock
1	101	Laptop	Electronics	799	50
2	102	Smartphone	Electronics	599	30
3	103	Tablet	Electronics	399	40
4	104	Headphones	Accessories	149	60
5	105	Monitor	Electronics	249	20
6	106	Keyboard	Accessories	89	100
7	107	Mouse	Accessories	49	150
8	108	Camera	Electronics	599	25
9	109	Speaker	Accessories	79	70
10	110	Printer	Electronics	149	50

Code :

```
#Mitashi Dua 08201032024 IT-2
# Load necessary libraries
install.packages("ggplot2")  # Install if not already installed
library(ggplot2)

# Create the dataframe
df <- data.frame(
  Product_ID = c(101, 102, 103, 104, 105, 106, 107, 108, 109, 110),
  Product_Name = c("Laptop", "Smartphone", "Tablet", "Headphones", "Monitor",
                   "Keyboard", "Mouse", "Camera", "Speaker", "Printer"),
  Category = c("Electronics", "Electronics", "Electronics", "Accessories", "Electronics",
               "Accessories", "Accessories", "Electronics", "Accessories", "Electronics"),
  Price = c(799, 599, 399, 149, 249, 89, 49, 599, 79, 149),
  Stock = c(50, 30, 40, 60, 20, 100, 150, 25, 70, 50)
)
View(df)
```

Output :

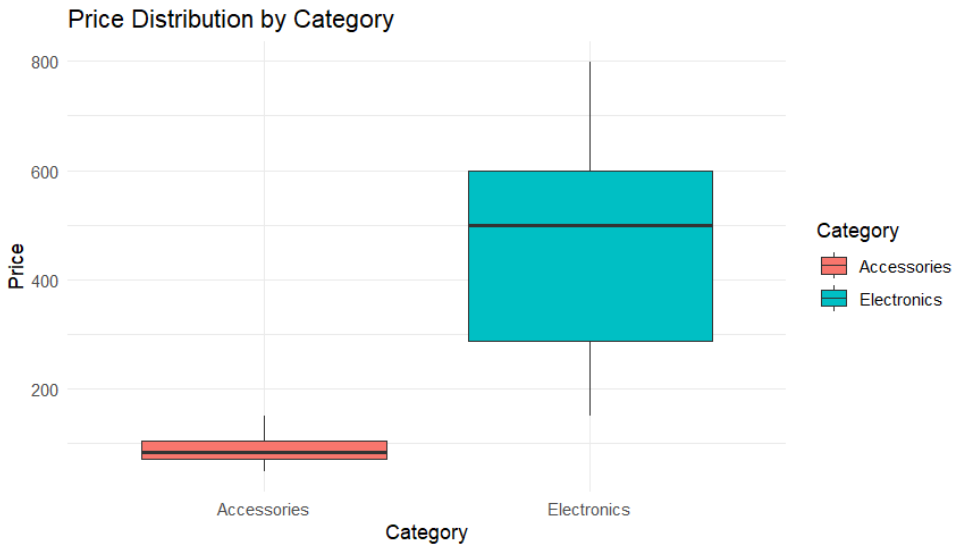
	Product_ID	Product_Name	Category	Price	Stock
1	101	Laptop	Electronics	799	50
2	102	Smartphone	Electronics	599	30
3	103	Tablet	Electronics	399	40
4	104	Headphones	Accessories	149	60
5	105	Monitor	Electronics	249	20
6	106	Keyboard	Accessories	89	100
7	107	Mouse	Accessories	49	150
8	108	Camera	Electronics	599	25
9	109	Speaker	Accessories	79	70
10	110	Printer	Electronics	149	50

a) Create a box plot for Price distribution by Category.

Code :

```
#Mitashi Dua 08201032024 IT-2
# a) Create a box plot for Price distribution by Category
ggplot(df, aes(x = Category, y = Price, fill = Category)) +
  geom_boxplot() +
  theme_minimal() +
  labs(title = "Price Distribution by Category", x = "Category", y = "Price")
```

Output :

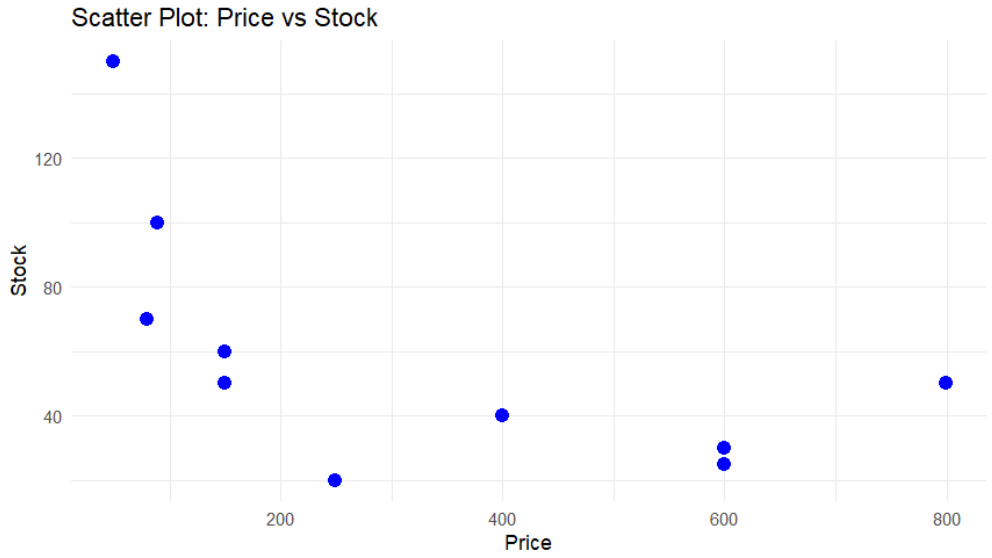


b) Create a scatter plot to analyze the relationship between Price and Stock.

Code :

```
#Mitashi Dua 08201032024 IT-2
# b) Create a scatter plot to analyze the relationship between Price and Stock
ggplot(df, aes(x = Price, y = Stock)) +
  geom_point(color = "blue", size = 3) +
  theme_minimal() +
  labs(title = "Scatter Plot: Price vs Stock", x = "Price", y = "Stock")
```

Output :


Scatter Plot: Price vs Stock
Stock
120
80
40
200
400
600
800
Price