PART – B: PYTHON PROGRAMMING

Program 1 - Probability

(a): Calculating the simple probabilities

```
import random

num_trials = int(input("Enter number of trials: "))
rolls_per_trial = int(input("For each trial, how many rolls: "))
roll_up_value = int(input("Enter the rollup value to count (e.g., 6): "))

poss_outcomes = 0
for i in range(num_trials):
    print(f"Trial {i+1}:")
    for _ in range(rolls_per_trial):
        result = random.randint(1, 6)
        print(result, end=" ")
        if result == roll_up_value:
            poss_outcomes += 1
    print("\n--------")

total_outcomes = num_trials * rolls_per_trial
print(f"Number of times {roll_up_value} appeared in {num_trials} trials of {rolls_per_trial}
rolls each: {poss_outcomes}")
print("Probability =", poss_outcomes / total_outcomes if total_outcomes else 0)
```

(b): Applications of Probability distributions to real life problems

```
from scipy.stats import binom

# Parameters for binomial distribution
n = 5       # number of trials (e.g., coin tosses)
p = 0.5     # probability of success on each trial (e.g., getting heads)
k = 3       # number of successes (e.g., exactly 3 heads)

# Calculate probability of exactly k successes
prob = binom.pmf(k, n, p)

print(f"Probability of exactly {k} successes in {n} trials: {prob:.4f}")
```

Program 2: Test of significance

a) One Sample T-Test, Two Independent Test, Paired T-Test

b) ANOVA Test, Chi-Square Test

```
import pandas as pd
from scipy import stats
titanic_data = pd.read_csv('train.csv')

# One Sample T-Test: Checking mean age against a hypothetical mean
hypothetical_mean_age = 30
ttest_one_sample = stats.ttest_1samp(titanic_data['Age'].dropna(),
hypothetical_mean_age)
print("One Sample T-Test:")
print("T-statistic:", ttest_one_sample.statistic)
print("p-value:", ttest_one_sample.pvalue)

# Two Independent Samples T-Test: Comparing ages of male and female passengers
male_ages = titanic_data[titanic_data['Sex'] == 'male']['Age'].dropna()
female_ages = titanic_data[titanic_data['Sex'] == 'female']['Age'].dropna()
ttest_two_ind_samples = stats.ttest_ind(male_ages, female_ages)
print("\nTwo Independent Samples T-Test:")
print("T-statistic:", ttest_two_ind_samples.statistic)
print("p-value:", ttest_two_ind_samples.pvalue)

# Paired T-Test: Comparing fares before and after
before_fares = titanic_data['Fare'].dropna()
after_fares = before_fares * 1.2 # Assuming a 20% increase in fares
ttest_paired = stats.ttest_rel(before_fares, after_fares)
print("\nPaired T-Test:")
print("T-statistic:", ttest_paired.statistic)
print("p-value:", ttest_paired.pvalue)

# ANOVA Test: Impact of passenger class on fares
anova_result = stats.f_oneway(titanic_data[titanic_data['Pclass'] == 1]['Fare'].dropna(),
 titanic_data[titanic_data['Pclass'] == 2]['Fare'].dropna(),
 titanic_data[titanic_data['Pclass'] == 3]['Fare'].dropna())
print("\nANOVA Test Result:")
print("F-statistic:", anova_result.statistic)
print("p-value:", anova_result.pvalue)

# Chi-Square Test: Relationship between survival status and passenger class
chi2_table = pd.crosstab(titanic_data['Survived'], titanic_data['Pclass'])
chi2_result = stats.chi2_contingency(chi2_table)
print("\nChi-Square Test Result:")
print("Chi-Square statistic:", chi2_result[0])
print("p-value:", chi2_result[1])
```

1. Introduction to Power BI- Get Started with Power BI - Sign up for Power BI - Overview: Power BI data sources - Connect to a SaaS solution - Upload a local CSV file - Connect to Excel data that can be refreshed - Create a Report with Visualizations.

Introduction to Power BI : Power BI is a business analytics tool developed by Microsoft, allowing users to visualize, analyze, and share insights from data interactively. It integrates with a wide variety of data sources and enables rich visual reporting.

Getting Started with Power BI Desktop

- Download and install Power BI Desktop from the official Microsoft website. (powerbi.microsoft.com)
- Once installed, launch Power BI Desktop and create a free account using your email address. Education emails often qualify for extended features.
- After signing in, you will see the Power BI Desktop home screen with options to start new reports, get data.

Overview: Power BI Data Sources

Power BI Desktop supports connecting to several types of data sources:

- File sources: Excel, CSV, XML, JSON, Folders.
- Database sources: SQL Server, MySQL, Oracle, Access, PostgreSQL
- Online or SaaS sources: Azure, Google Analytics, Salesforce, SharePoint, Dynamics 365
- Power Platform sources: Power BI datasets, Dataflows, Common Data Services (now Dataverse).

Connect to a SaaS Solution

- Click on "Get Data" in the toolbar.
- Select "Online Services" such as Google Analytics, Salesforce, or Microsoft Dynamics 365.
- Authenticate with your SaaS account credentials.
- Select the desired dataset and load it into Power BI Desktop for analysis.

Upload a Local CSV File

- In Power BI Desktop, click "Home" > "Get Data" > "Text/CSV."
- Browse to your local CSV file and select "Open."
- Power BI will preview your data; click "Load" to import it into your report.
- Use the Query Editor to clean or transform the data if needed.

Connect to Excel Data That Can Be Refreshed

- Click "Get Data" > "Excel Workbook."
- Browse to your Excel file and select it.
- Choose the sheets or tables you want to import.
- Once loaded, your data remains linked to the original Excel file—changes in the source can be refreshed in Power BI by clicking "Refresh" in the toolbar.

Create a Report with Visualizations

- Click on "Report" view in Power BI Desktop.
- Drag desired fields from your data model onto the canvas to create visualizations such as bar charts, pie charts, cards, maps, and tables.
- Use the "Visualizations" pane to select and customize chart types.
- Arrange and format your visuals using the formatting options (color, title, labels, etc.).
- Save your report as a .pbix file. (Ex: program1.pbix)

2. Using visualizations - Create a new report - Create and arrange visualizations - Format a visualization - Use text, map, and gauge visualizations and save a report - Use a slicer to filter visualizations - Sort, copy, and paste visualizations

Create a New Report

- Open Power BI Desktop and click "New Report."
- Import your dataset by selecting “Get Data” and choosing your data source (Excel, CSV, database, etc.).
- Once the data is loaded, you’ll see it in the Fields pane.

Create and Arrange Visualizations

- In the "Report" view, drag a field from the Fields pane to the canvas.
- Choose a visualization from the Visualizations pane: bar chart, column chart, pie chart, table, map, or gauge.
- Resize or move a visual by clicking and dragging its border.
- Arrange multiple visuals on the canvas to create your report layout.

Format a Visualization

- Click the visualization you want to format.
- In the Visualizations pane, select the "Format" (paint brush) icon.
- Customize visual elements:
- Change colors, fonts, and background.
- Add titles, data labels, gridlines, and legend.

Use Text, Map, and Gauge Visualizations

- Text: Use the "Card" visualization to show single numbers, or the "Text box" (Insert > Text box) to add custom notes and headers.
- Map: Select the "Map" visual, add fields containing geographic data such as city, country, or latitude/longitude to plot data points.
- Gauge: Choose the "Gauge" visual for metrics that have target values (e.g., KPI against a goal).

Save a Report

- Click "File" > "Save" and give your report a name.
- Reports are saved as “.pbix” files, letting you edit or share them later.
- You can also export as PDF for submission or print for documentation.

Use a Slicer to Filter Visualizations

- In the Visualizations pane, select the "Slicer" icon.
- Drag the field you want to filter by (e.g., Category, Date) to the slicer.
- Select filter options in the slicer; all visuals on the page update automatically to reflect the selected filter.

Sort, Copy, and Paste Visualizations

- Sort: Click on your visual, then click the ellipsis (…) and choose "Sort by" to sort the data as needed.
- Copy: Select a visual, press Ctrl+C (or right-click > Copy).
- Paste: Click the canvas, press Ctrl+V (or right-click > Paste) to duplicate the visual in the same or another report.

3. Modify and Print a Report - Rename and delete report pages - Add a filter to a page or report Set visualization interactions - Send a report to PowerPoint

Modify and Print a Report

- Open your report in Power BI Desktop or Power BI Service.
- To print: In Power BI Desktop / Service, open the report and select Print from the toolbar. Adjust print layout and margins as needed before confirming.

Rename and Delete Report Pages

- To rename a report page, right-click the page tab at the bottom and select Rename. Enter your preferred page title.
- To delete a report page, right-click the page tab and select Delete. Confirm deletion when prompted.
- You can also add new pages using the plus sign (+) beside page tabs.

Add a Filter to a Page or Report

- To add a page filter, drag a field into the Filters pane under "Page level filters" and choose your filter settings.
- For report-level filters, drag fields to "Report level filters"—these apply across all pages of the report.
- Adjust filter options for single or multiple selections and visibility for viewers.

Set Visualization Interactions

- In the ribbon, select Format > Edit Interactions.
- Select a visualization; icons will appear on other visuals: "filter," "highlight," or "none".
- Click the desired interaction icon to control how one visual affects others (filter, highlight, or ignore).

Send/Export a Report to PowerPoint

- In Power BI Service (browser), open your report.
- Click Export > PowerPoint in the toolbar.