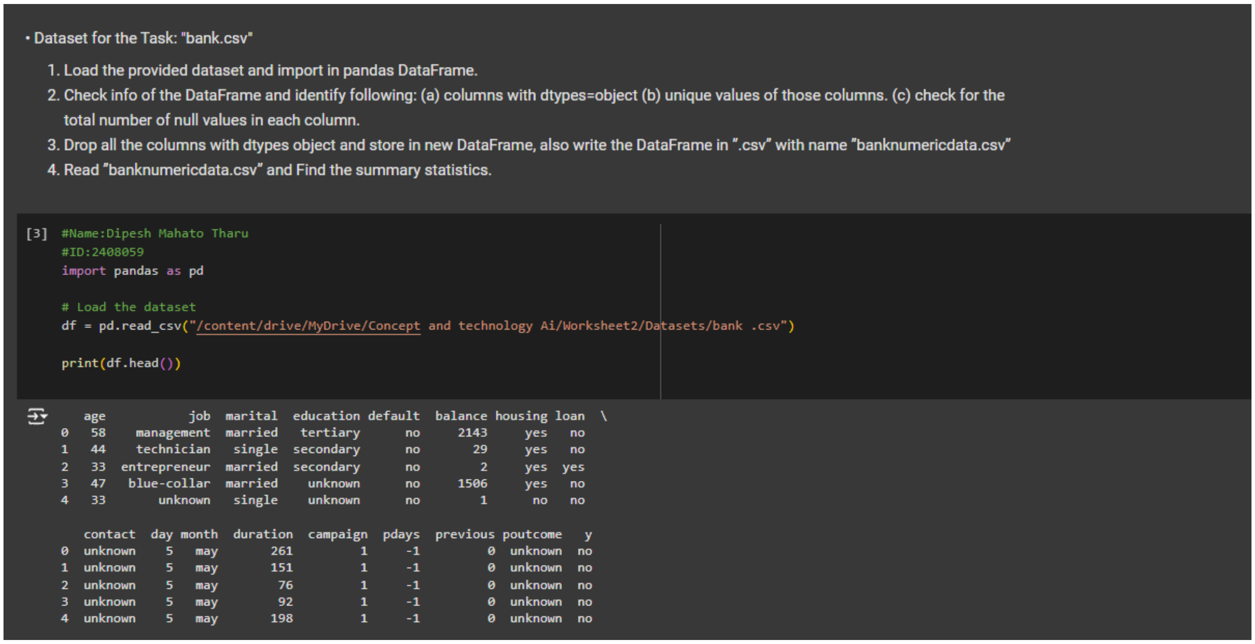


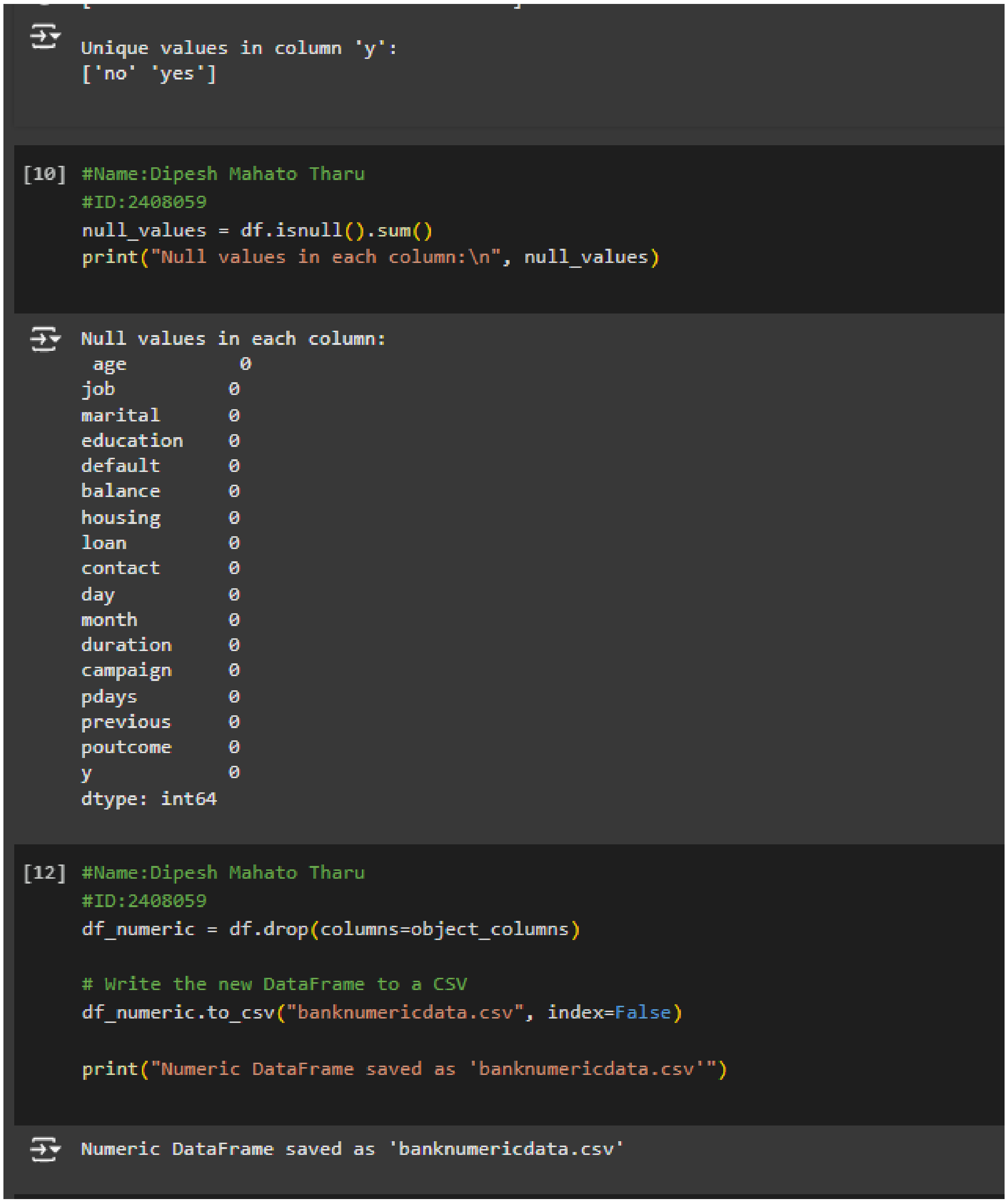
- Dataset for the Task: "bank.csv"

1. Load the provided dataset and import in pandas DataFrame.
2. Check info of the DataFrame and identify following: (a) columns with dtypes=object (b) unique values of those columns. (c) check for the total number of null values in each column.
3. Drop all the columns with dtypes object and store in new DataFrame, also write the DataFrame in ".csv" with name "banknumericdata.csv"
4. Read "banknumericdata.csv" and Find the summary statistics.

```
[3] #Name:Dipesh Mahato Tharu
    #ID:2408059
    import pandas as pd

    # Load the dataset
    df = pd.read_csv("/content/drive/MyDrive/Concept and technology Ai/Worksheet2/Datasets/bank .csv")

    print(df.head())
```

```
   age           job  marital  education default  balance housing loan  \
0   58    management  married   tertiary      no     2143     yes   no
1   44    technician   single  secondary      no       29     yes   no
2   33  entrepreneur  married  secondary      no        2     yes  yes
3   47   blue-collar  married    unknown      no     1506     yes   no
4   33       unknown   single    unknown      no        1      no   no

   contact  day month  duration  campaign  pdays  previous poutcome   y
0  unknown    5   may       261         1     -1         0  unknown  no
1  unknown    5   may       151         1     -1         0  unknown  no
2  unknown    5   may        76         1     -1         0  unknown  no
3  unknown    5   may        92         1     -1         0  unknown  no
4  unknown    5   may       198         1     -1         0  unknown  no
```

OBJ



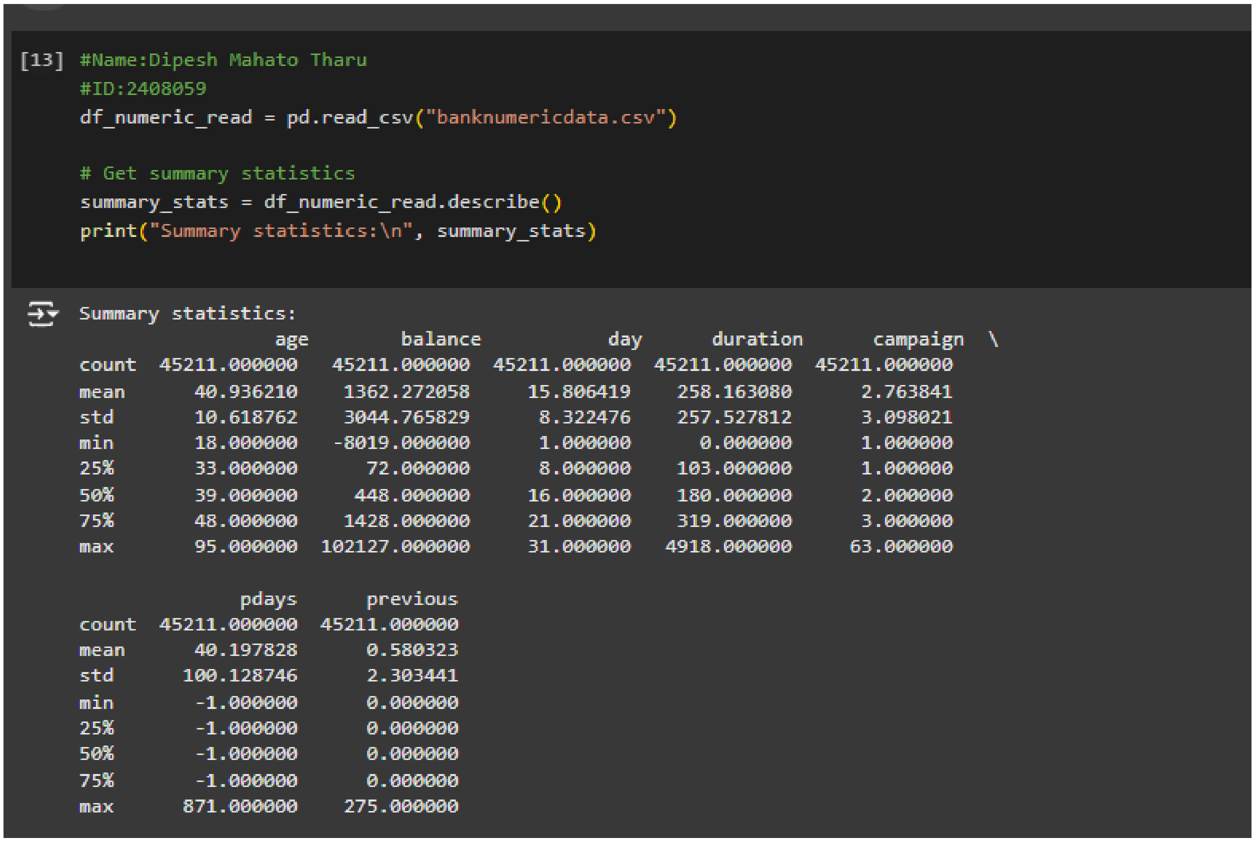
```
Unique values in column 'y':
['no' 'yes']
```

[10]
```
#Name:Dipesh Mahato Tharu
#ID:2408059
null_values = df.isnull().sum()
print("Null values in each column:\n", null_values)
```

```
Null values in each column:
 age          0
job          0
marital      0
education    0
default      0
balance      0
housing      0
loan         0
contact      0
day          0
month        0
duration     0
campaign     0
pdays        0
previous     0
poutcome     0
y            0
dtype: int64
```

[12]
```
#Name:Dipesh Mahato Tharu
#ID:2408059
df_numeric = df.drop(columns=object_columns)

# Write the new DataFrame to a CSV
df_numeric.to_csv("banknumericdata.csv", index=False)

print("Numeric DataFrame saved as 'banknumericdata.csv'")
```

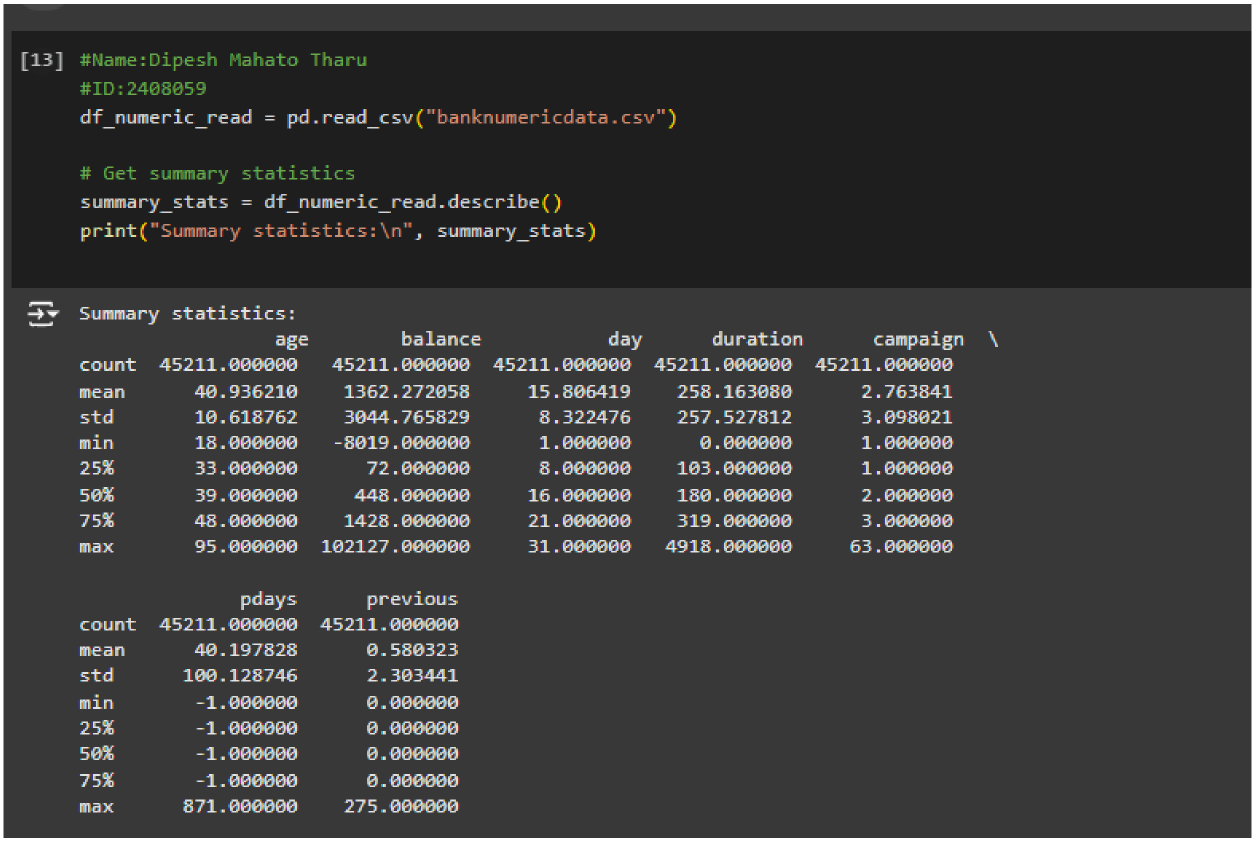
```
Numeric DataFrame saved as 'banknumericdata.csv'
```



[13]

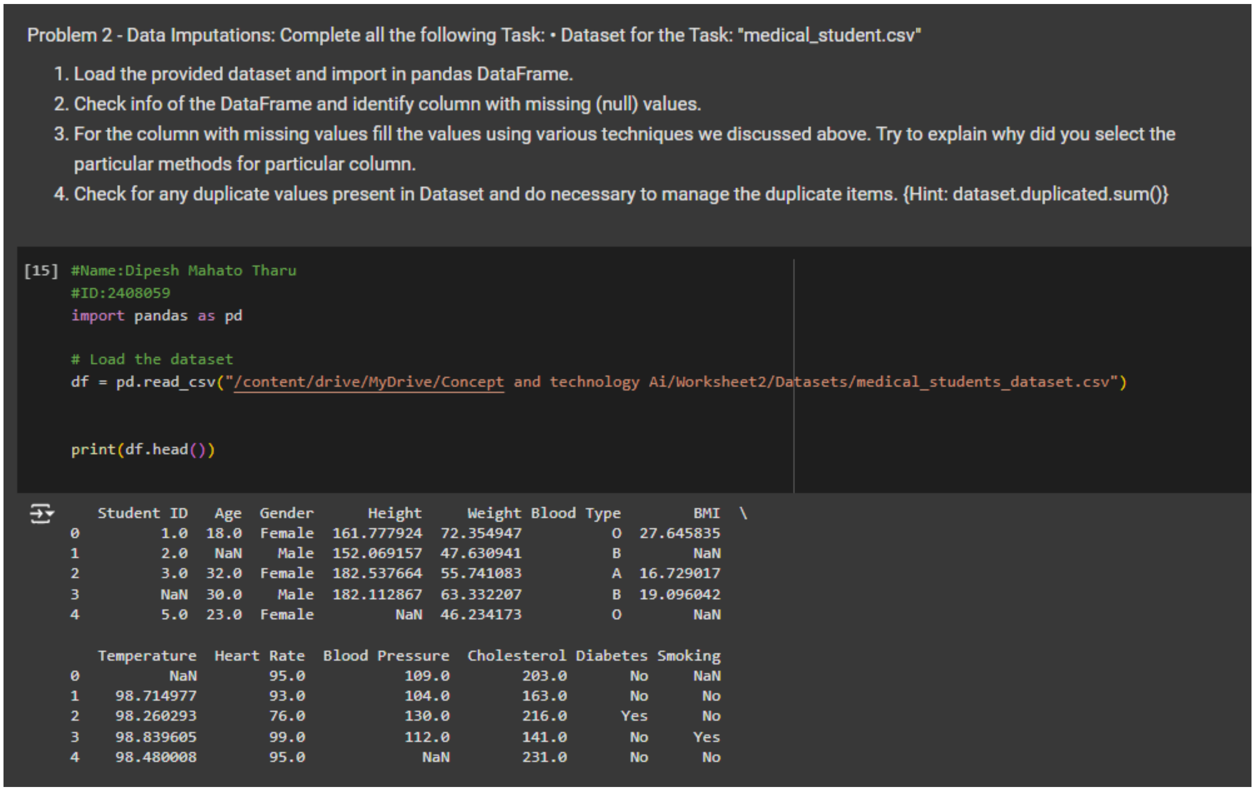
```
#Name:Dipesh Mahato Tharu
#ID:2408059
df_numeric_read = pd.read_csv("banknumericdata.csv")

# Get summary statistics
summary_stats = df_numeric_read.describe()
print("Summary statistics:\n", summary_stats)
```

```
Summary statistics:
                 age        balance           day      duration      campaign  \
count  45211.000000   45211.000000  45211.000000  45211.000000  45211.000000
mean      40.936210    1362.272058     15.806419    258.163080      2.763841
std       10.618762    3044.765829      8.322476    257.527812      3.098021
min       18.000000   -8019.000000      1.000000      0.000000      1.000000
25%       33.000000      72.000000      8.000000    103.000000      1.000000
50%       39.000000     448.000000     16.000000    180.000000      2.000000
75%       48.000000    1428.000000     21.000000    319.000000      3.000000
max       95.000000  102127.000000     31.000000   4918.000000     63.000000

              pdays      previous
count  45211.000000  45211.000000
mean      40.197828      0.580323
std      100.128746      2.303441
min       -1.000000      0.000000
25%       -1.000000      0.000000
50%       -1.000000      0.000000
75%       -1.000000      0.000000
max      871.000000    275.000000
```



```
[13] #Name:Dipesh Mahato Tharu
     #ID:2408059
     df_numeric_read = pd.read_csv("banknumericdata.csv")

     # Get summary statistics
     summary_stats = df_numeric_read.describe()
     print("Summary statistics:\n", summary_stats)
```

```
Summary statistics:
                 age        balance           day      duration      campaign  \
count  45211.000000   45211.000000  45211.000000  45211.000000  45211.000000
mean      40.936210    1362.272058     15.806419    258.163080      2.763841
std       10.618762    3044.765829      8.322476    257.527812      3.098021
min       18.000000   -8019.000000      1.000000      0.000000      1.000000
25%       33.000000      72.000000      8.000000    103.000000      1.000000
50%       39.000000     448.000000     16.000000    180.000000      2.000000
75%       48.000000    1428.000000     21.000000    319.000000      3.000000
max       95.000000  102127.000000     31.000000   4918.000000     63.000000

              pdays      previous
count  45211.000000  45211.000000
mean      40.197828      0.580323
std      100.128746      2.303441
min       -1.000000      0.000000
25%       -1.000000      0.000000
50%       -1.000000      0.000000
75%       -1.000000      0.000000
max      871.000000    275.000000
```

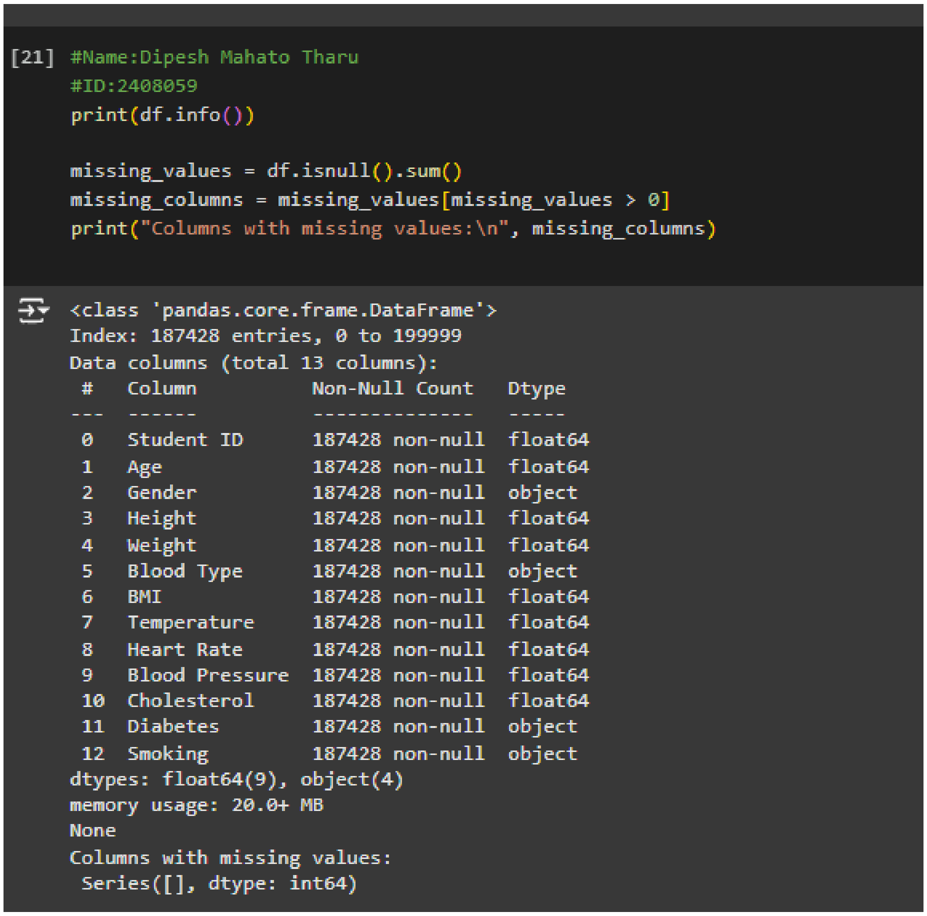


Problem 2 - Data Imputations: Complete all the following Task: • Dataset for the Task: "medical_student.csv"

1. Load the provided dataset and import in pandas DataFrame.
2. Check info of the DataFrame and identify column with missing (null) values.
3. For the column with missing values fill the values using various techniques we discussed above. Try to explain why did you select the particular methods for particular column.
4. Check for any duplicate values present in Dataset and do necessary to manage the duplicate items. {Hint: dataset.duplicated.sum()}

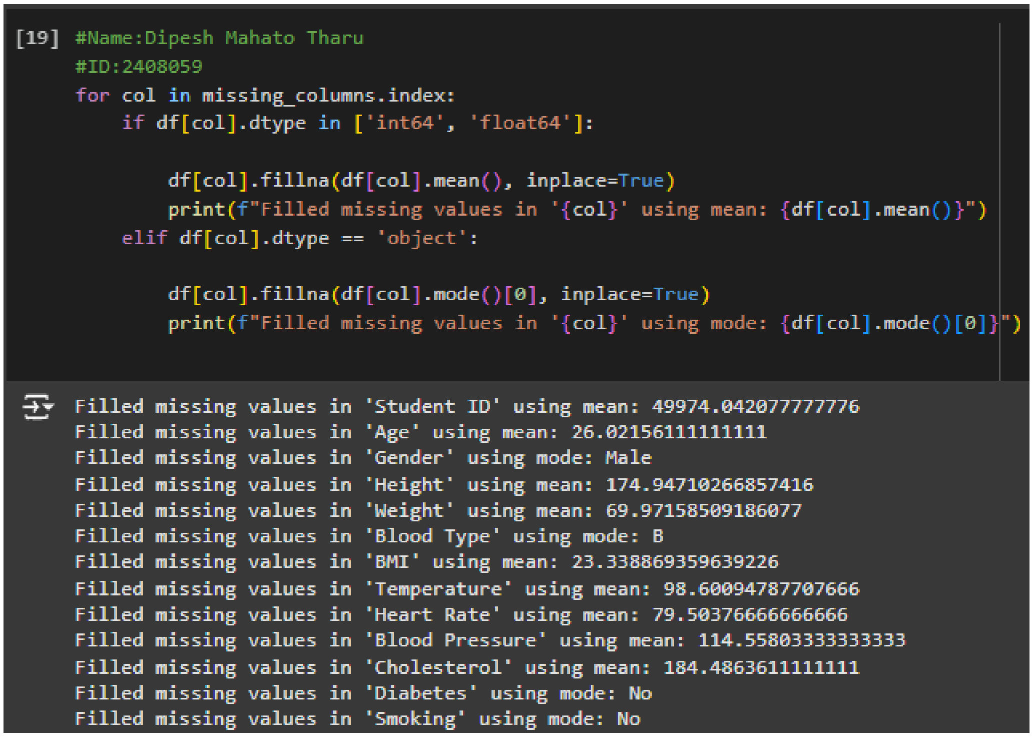
```
[15] #Name:Dipesh Mahato Tharu
     #ID:2408059
     import pandas as pd

     # Load the dataset
     df = pd.read_csv("/content/drive/MyDrive/Concept and technology Ai/Worksheet2/Datasets/medical_students_dataset.csv")


     print(df.head())
```

```
   Student ID   Age  Gender      Height     Weight Blood Type        BMI  \
0         1.0  18.0  Female  161.777924  72.354947          O  27.645835
1         2.0   NaN    Male  152.069157  47.630941          B        NaN
2         3.0  32.0  Female  182.537664  55.741083          A  16.729017
3         NaN  30.0    Male  182.112867  63.332207          B  19.096042
4         5.0  23.0  Female         NaN  46.234173          O        NaN

   Temperature  Heart Rate  Blood Pressure  Cholesterol Diabetes Smoking
0          NaN        95.0           109.0        203.0       No     NaN
1    98.714977        93.0           104.0        163.0       No      No
2    98.260293        76.0           130.0        216.0      Yes      No
3    98.839605        99.0           112.0        141.0       No     Yes
4    98.480008        95.0             NaN        231.0       No      No
```



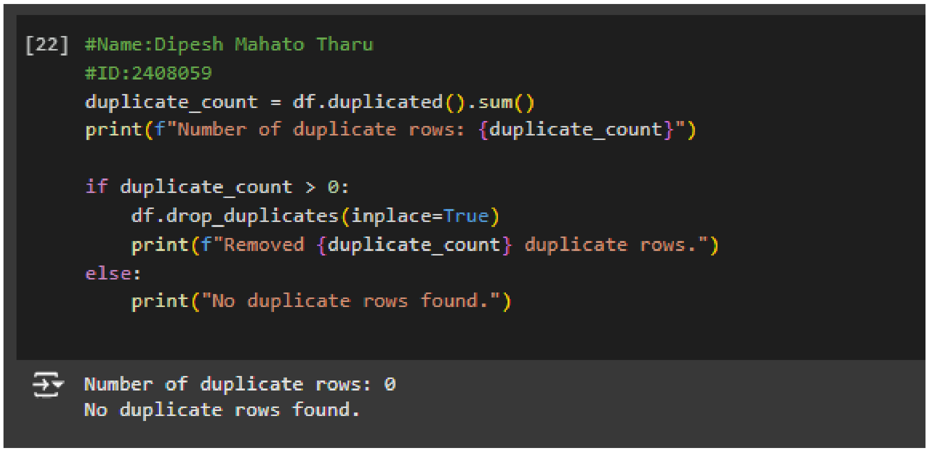
```
[21] #Name:Dipesh Mahato Tharu
     #ID:2408059
     print(df.info())

     missing_values = df.isnull().sum()
     missing_columns = missing_values[missing_values > 0]
     print("Columns with missing values:\n", missing_columns)
```

```
<class 'pandas.core.frame.DataFrame'>
Index: 187428 entries, 0 to 199999
Data columns (total 13 columns):
 #   Column          Non-Null Count   Dtype  
---  ------          --------------   -----  
 0   Student ID      187428 non-null  float64
 1   Age             187428 non-null  float64
 2   Gender          187428 non-null  object 
 3   Height          187428 non-null  float64
 4   Weight          187428 non-null  float64
 5   Blood Type      187428 non-null  object 
 6   BMI             187428 non-null  float64
 7   Temperature     187428 non-null  float64
 8   Heart Rate      187428 non-null  float64
 9   Blood Pressure  187428 non-null  float64
 10  Cholesterol     187428 non-null  float64
 11  Diabetes        187428 non-null  object 
 12  Smoking         187428 non-null  object 
dtypes: float64(9), object(4)
memory usage: 20.0+ MB
None
Columns with missing values:
 Series([], dtype: int64)
```



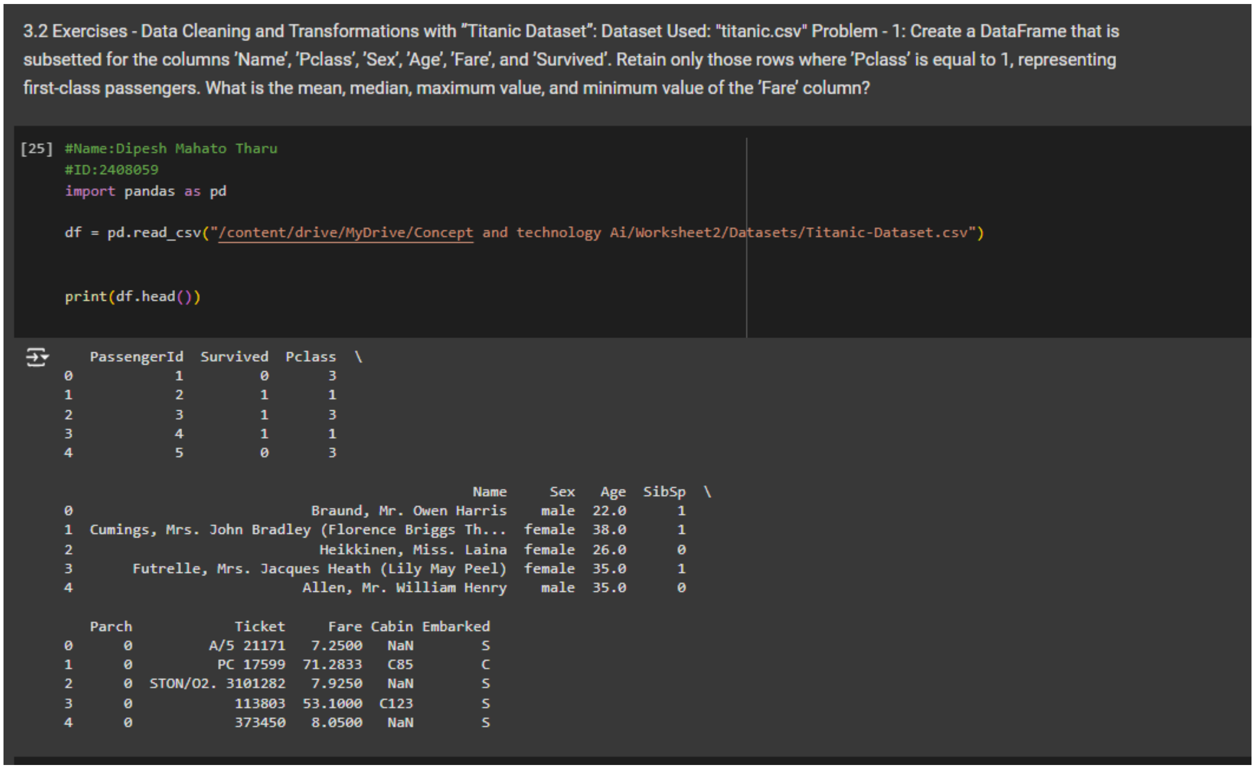
```
[19] #Name:Dipesh Mahato Tharu
     #ID:2408059
     for col in missing_columns.index:
         if df[col].dtype in ['int64', 'float64']:

             df[col].fillna(df[col].mean(), inplace=True)
             print(f"Filled missing values in '{col}' using mean: {df[col].mean()}")
         elif df[col].dtype == 'object':

             df[col].fillna(df[col].mode()[0], inplace=True)
             print(f"Filled missing values in '{col}' using mode: {df[col].mode()[0]}")
```

```
Filled missing values in 'Student ID' using mean: 49974.042077777776
Filled missing values in 'Age' using mean: 26.02156111111111
Filled missing values in 'Gender' using mode: Male
Filled missing values in 'Height' using mean: 174.94710266857416
Filled missing values in 'Weight' using mean: 69.97158509186077
Filled missing values in 'Blood Type' using mode: B
Filled missing values in 'BMI' using mean: 23.338869359639226
Filled missing values in 'Temperature' using mean: 98.60094787707666
Filled missing values in 'Heart Rate' using mean: 79.50376666666666
Filled missing values in 'Blood Pressure' using mean: 114.55803333333333
Filled missing values in 'Cholesterol' using mean: 184.4863611111111
Filled missing values in 'Diabetes' using mode: No
Filled missing values in 'Smoking' using mode: No
```



```
[22] #Name:Dipesh Mahato Tharu
     #ID:2408059
     duplicate_count = df.duplicated().sum()
     print(f"Number of duplicate rows: {duplicate_count}")

     if duplicate_count > 0:
         df.drop_duplicates(inplace=True)
         print(f"Removed {duplicate_count} duplicate rows.")
     else:
         print("No duplicate rows found.")
```

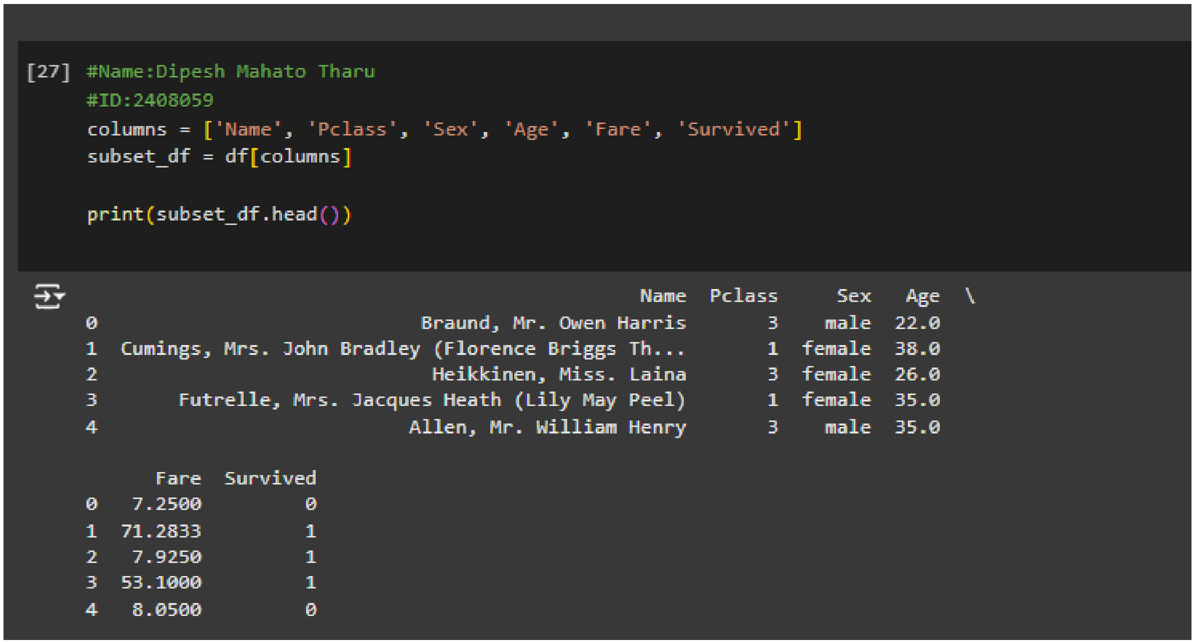
```
Number of duplicate rows: 0
No duplicate rows found.
```



3.2 Exercises - Data Cleaning and Transformations with "Titanic Dataset": Dataset Used: "titanic.csv" Problem - 1: Create a DataFrame that is subsetted for the columns 'Name', 'Pclass', 'Sex', 'Age', 'Fare', and 'Survived'. Retain only those rows where 'Pclass' is equal to 1, representing first-class passengers. What is the mean, median, maximum value, and minimum value of the 'Fare' column?

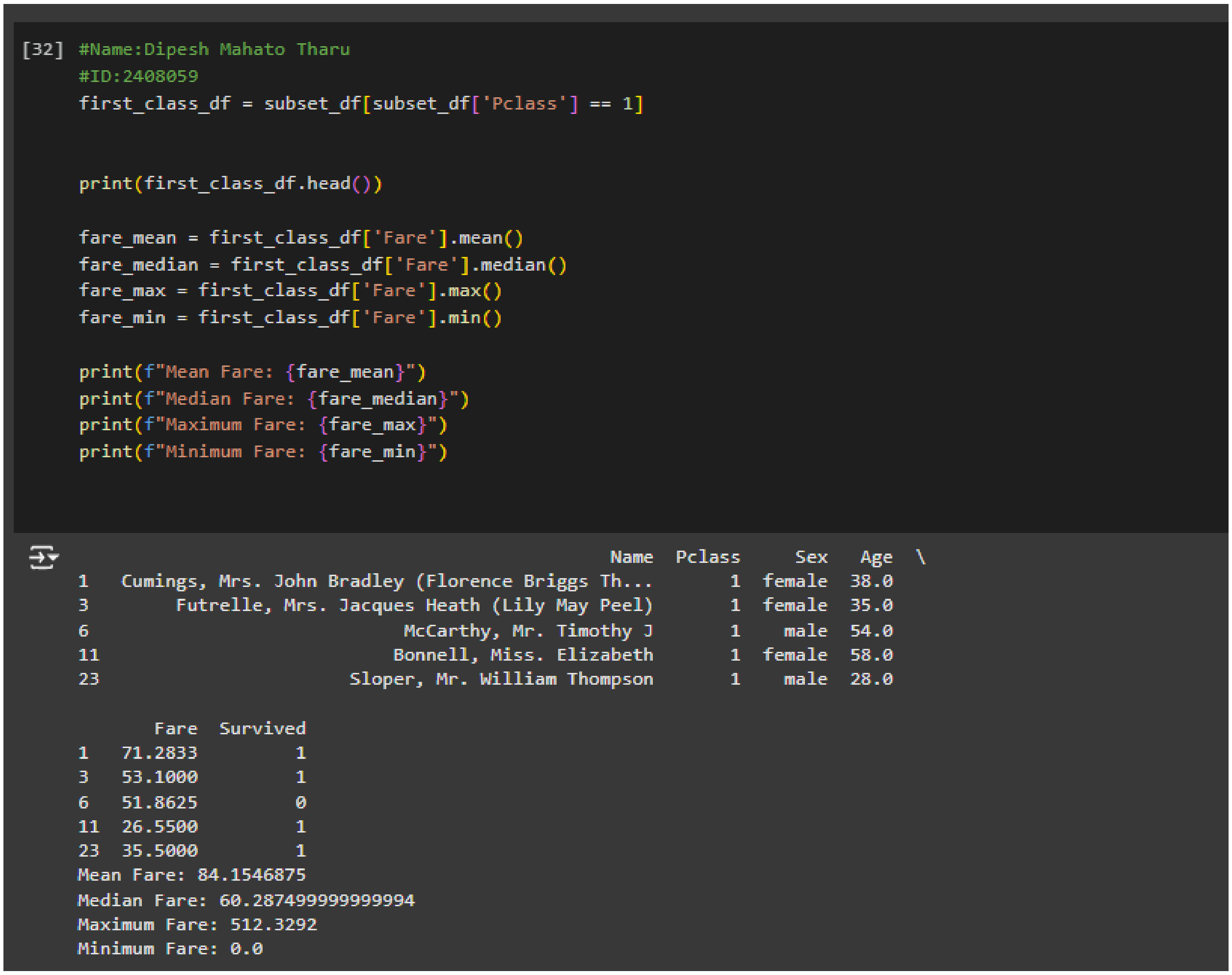
```
[25] #Name:Dipesh Mahato Tharu
     #ID:2408059
     import pandas as pd

     df = pd.read_csv("/content/drive/MyDrive/Concept and technology Ai/Worksheet2/Datasets/Titanic-Dataset.csv")


     print(df.head())
```

```
   PassengerId  Survived  Pclass  \
0            1         0       3
1            2         1       1
2            3         1       3
3            4         1       1
4            5         0       3

                                                Name     Sex   Age  SibSp  \
0                            Braund, Mr. Owen Harris    male  22.0      1
1  Cumings, Mrs. John Bradley (Florence Briggs Th...  female  38.0      1
2                             Heikkinen, Miss. Laina  female  26.0      0
3       Futrelle, Mrs. Jacques Heath (Lily May Peel)  female  35.0      1
4                           Allen, Mr. William Henry    male  35.0      0

   Parch            Ticket     Fare Cabin Embarked
0      0         A/5 21171   7.2500   NaN        S
1      0          PC 17599  71.2833   C85        C
2      0  STON/O2. 3101282   7.9250   NaN        S
3      0            113803  53.1000  C123        S
4      0            373450   8.0500   NaN        S
```



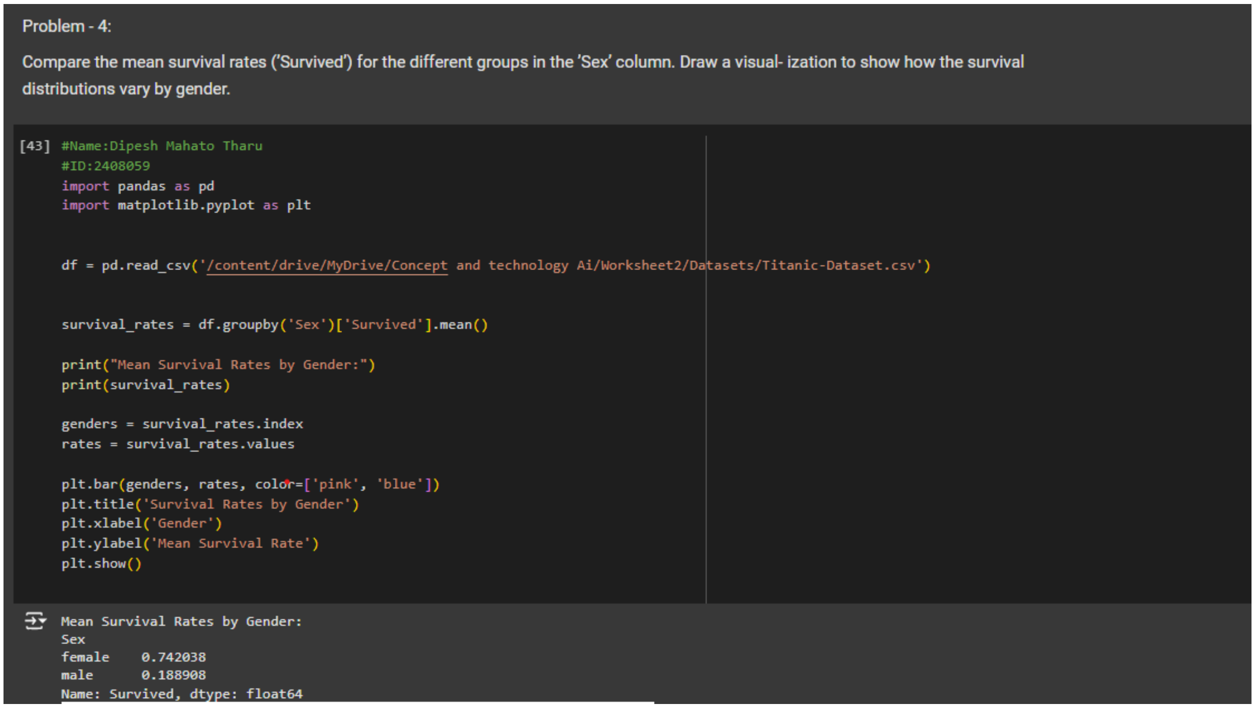
```
[27] #Name:Dipesh Mahato Tharu
     #ID:2408059
     columns = ['Name', 'Pclass', 'Sex', 'Age', 'Fare', 'Survived']
     subset_df = df[columns]

     print(subset_df.head())
```

```
                                                Name  Pclass     Sex   Age  \
0                            Braund, Mr. Owen Harris       3    male  22.0
1  Cumings, Mrs. John Bradley (Florence Briggs Th...       1  female  38.0
2                             Heikkinen, Miss. Laina       3  female  26.0
3       Futrelle, Mrs. Jacques Heath (Lily May Peel)       1  female  35.0
4                           Allen, Mr. William Henry       3    male  35.0

      Fare  Survived
0   7.2500         0
1  71.2833         1
2   7.9250         1
3  53.1000         1
4   8.0500         0
```



```
[32] #Name:Dipesh Mahato Tharu
     #ID:2408059
     first_class_df = subset_df[subset_df['Pclass'] == 1]


     print(first_class_df.head())

     fare_mean = first_class_df['Fare'].mean()
     fare_median = first_class_df['Fare'].median()
     fare_max = first_class_df['Fare'].max()
     fare_min = first_class_df['Fare'].min()

     print(f"Mean Fare: {fare_mean}")
     print(f"Median Fare: {fare_median}")
     print(f"Maximum Fare: {fare_max}")
     print(f"Minimum Fare: {fare_min}")
```

```
                                                 Name  Pclass     Sex   Age  \
1   Cumings, Mrs. John Bradley (Florence Briggs Th...       1  female  38.0
3        Futrelle, Mrs. Jacques Heath (Lily May Peel)       1  female  35.0
6                             McCarthy, Mr. Timothy J       1    male  54.0
11                           Bonnell, Miss. Elizabeth       1  female  58.0
23                       Sloper, Mr. William Thompson       1    male  28.0

       Fare  Survived
1   71.2833         1
3   53.1000         1
6   51.8625         0
11  26.5500         1
23  35.5000         1
Mean Fare: 84.1546875
Median Fare: 60.287499999999994
Maximum Fare: 512.3292
Minimum Fare: 0.0
```

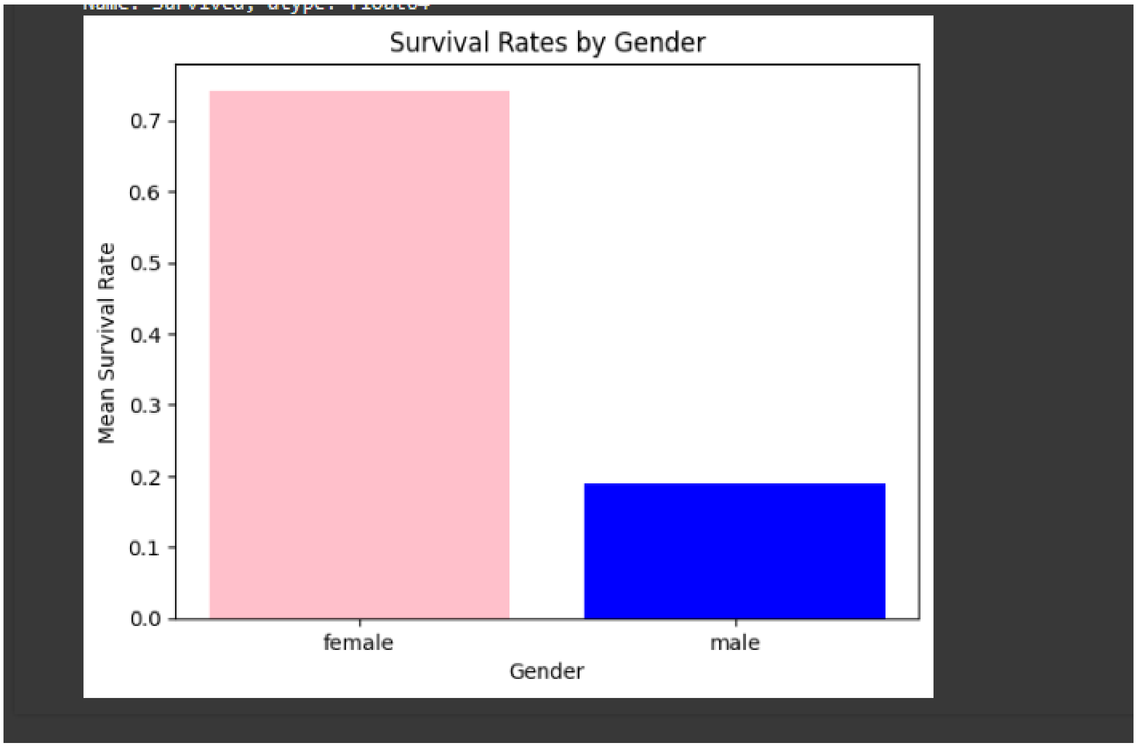


Problem - 4:

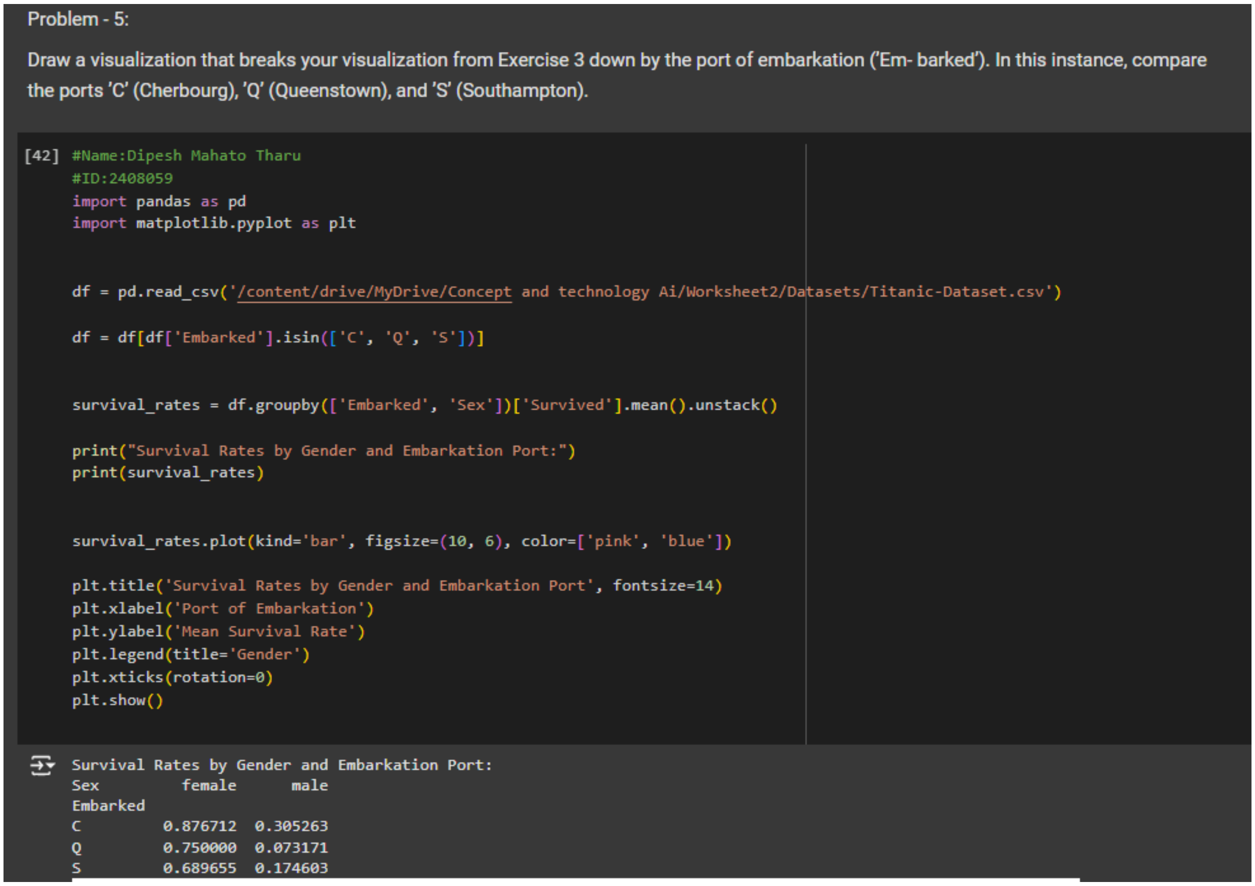
Compare the mean survival rates ('Survived') for the different groups in the 'Sex' column. Draw a visual- ization to show how the survival distributions vary by gender.

```
[43] #Name:Dipesh Mahato Tharu
     #ID:2408059
     import pandas as pd
     import matplotlib.pyplot as plt


     df = pd.read_csv('/content/drive/MyDrive/Concept and technology Ai/Worksheet2/Datasets/Titanic-Dataset.csv')


     survival_rates = df.groupby('Sex')['Survived'].mean()

     print("Mean Survival Rates by Gender:")
     print(survival_rates)

     genders = survival_rates.index
     rates = survival_rates.values

     plt.bar(genders, rates, color=['pink', 'blue'])
     plt.title('Survival Rates by Gender')
     plt.xlabel('Gender')
     plt.ylabel('Mean Survival Rate')
     plt.show()
```

```
Mean Survival Rates by Gender:
Sex
female    0.742038
male      0.188908
Name: Survived, dtype: float64
```



Name: Survived, dtype: float64

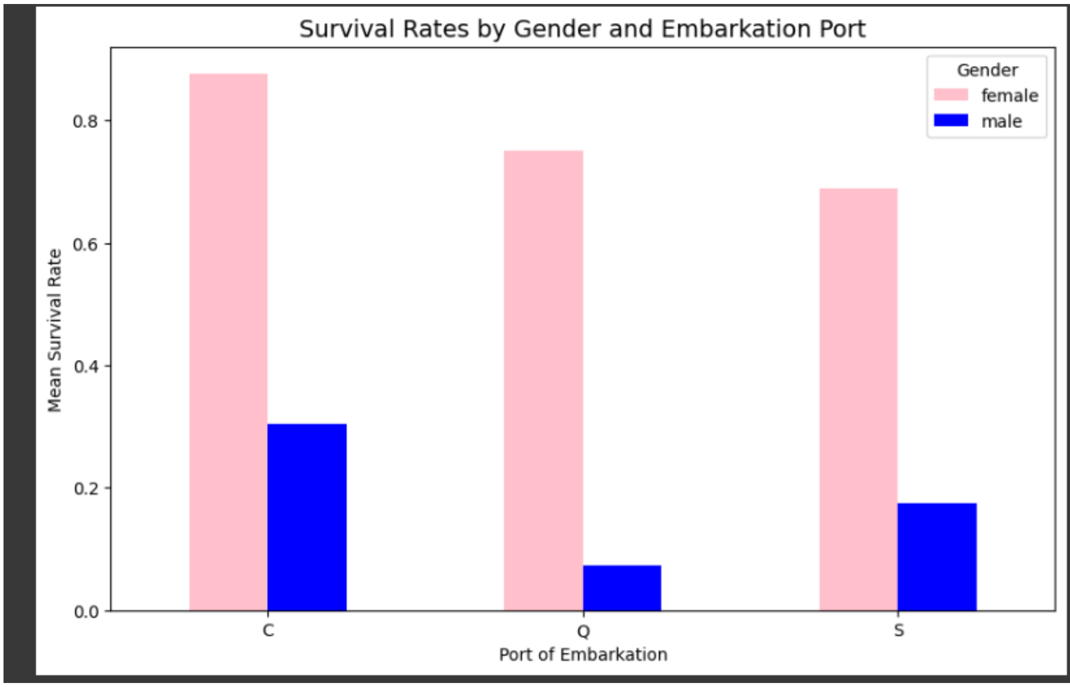


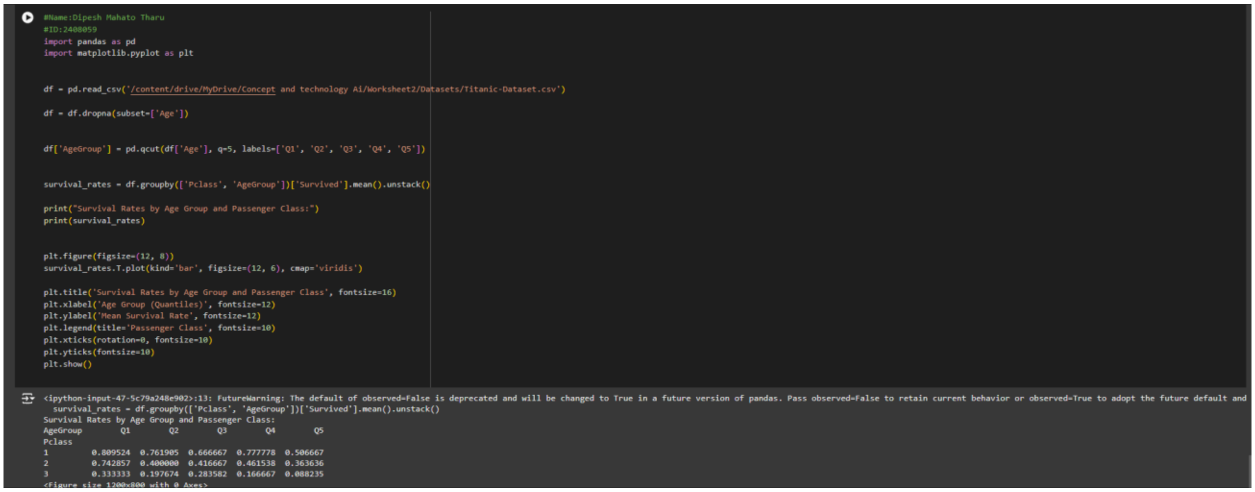
Problem - 5:

Draw a visualization that breaks your visualization from Exercise 3 down by the port of embarkation ('Em- barked'). In this instance, compare the ports 'C' (Cherbourg), 'Q' (Queenstown), and 'S' (Southampton).

```
[42] #Name:Dipesh Mahato Tharu
     #ID:2408059
     import pandas as pd
     import matplotlib.pyplot as plt


     df = pd.read_csv('/content/drive/MyDrive/Concept and technology Ai/Worksheet2/Datasets/Titanic-Dataset.csv')

     df = df[df['Embarked'].isin(['C', 'Q', 'S'])]


     survival_rates = df.groupby(['Embarked', 'Sex'])['Survived'].mean().unstack()

     print("Survival Rates by Gender and Embarkation Port:")
     print(survival_rates)


     survival_rates.plot(kind='bar', figsize=(10, 6), color=['pink', 'blue'])

     plt.title('Survival Rates by Gender and Embarkation Port', fontsize=14)
     plt.xlabel('Port of Embarkation')
     plt.ylabel('Mean Survival Rate')
     plt.legend(title='Gender')
     plt.xticks(rotation=0)
     plt.show()
```

```
Survival Rates by Gender and Embarkation Port:
Sex         female      male
Embarked
C         0.876712  0.305263
Q         0.750000  0.073171
S         0.689655  0.174603
```

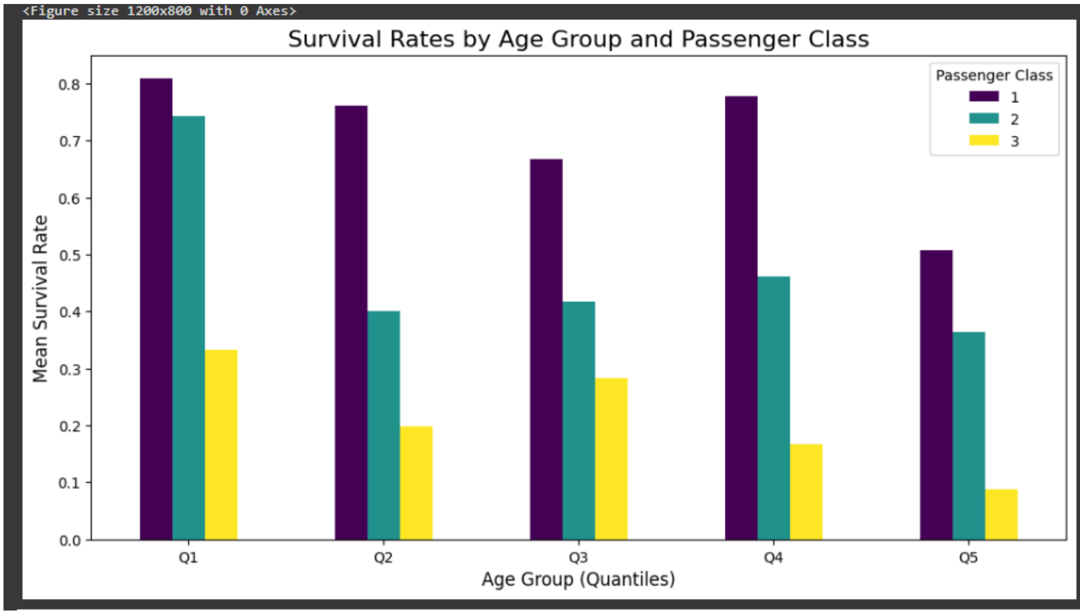




```
#Name:Dipesh Mahato Tharu
#ID:2408059
import pandas as pd
import matplotlib.pyplot as plt


df = pd.read_csv('/content/drive/MyDrive/Concept and technology Ai/Worksheet2/Datasets/Titanic-Dataset.csv')

df = df.dropna(subset=['Age'])


df['AgeGroup'] = pd.qcut(df['Age'], q=5, labels=['Q1', 'Q2', 'Q3', 'Q4', 'Q5'])


survival_rates = df.groupby(['Pclass', 'AgeGroup'])['Survived'].mean().unstack()

print("Survival Rates by Age Group and Passenger Class:")
print(survival_rates)


plt.figure(figsize=(12, 8))
survival_rates.T.plot(kind='bar', figsize=(12, 6), cmap='viridis')

plt.title('Survival Rates by Age Group and Passenger Class', fontsize=16)
plt.xlabel('Age Group (Quantiles)', fontsize=12)
plt.ylabel('Mean Survival Rate', fontsize=12)
plt.legend(title='Passenger Class', fontsize=10)
plt.xticks(rotation=0, fontsize=10)
plt.yticks(fontsize=10)
plt.show()
```

```
<ipython-input-47-5c79a248e902>:13: FutureWarning: The default of observed=False is deprecated and will be changed to True in a future version of pandas. Pass observed=False to retain current behavior or observed=True to adopt the future default and
  survival_rates = df.groupby(['Pclass', 'AgeGroup'])['Survived'].mean().unstack()
Survival Rates by Age Group and Passenger Class:
AgeGroup        Q1        Q2        Q3        Q4        Q5
Pclass
1         0.809524  0.761905  0.666667  0.777778  0.506667
2         0.742857  0.400000  0.416667  0.461538  0.363636
3         0.333333  0.197674  0.283582  0.166667  0.088235
<Figure size 1200x800 with 0 Axes>
```

```
<Figure size 1200x800 with 0 Axes>
```


Survival Rates by Age Group and Passenger Class
Passenger Class
Mean Survival Rate
Q1
Q2
Q3
Q4
Q5
Age Group (Quantiles)