```
import numpy as np
import pandas as pd
```

Storing file path in a variable for easy access

```
file_path = "../Data/Raw Data/titanic - titanic.csv"

#Original data will be stored in "Data" variable
Data = pd.read_csv(file_path)
#Copying data into "df" variable
df=Data
df = pd.DataFrame(df)
# We can use df.head() to see the data but we converted the data into
dataframe thus we print df
df
```

```
     PassengerId  Survived  Pclass  \
0              1         0       3
1              2         1       1
2              3         1       3
3              4         1       1
4              5         0       3
..           ...       ...     ...
886          887         0       2
887          888         1       1
888          889         0       3
889          890         1       1
890          891         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
..                                                ...     ...   ...
...
886                            Montvila, Rev. Juozas    male  27.0
0
887                     Graham, Miss. Margaret Edith  female  19.0
0
888           Johnston, Miss. Catherine Helen "Carrie"  female   NaN
1
```

```
889                                Behr, Mr. Karl Howell    male  26.0
0
890                                  Dooley, Mr. Patrick    male  32.0
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
..     ...               ...      ...   ...      ...
886      0            211536  13.0000   NaN        S
887      0            112053  30.0000   B42        S
888      2        W./C. 6607  23.4500   NaN        S
889      0            111369  30.0000  C148        C
890      0            370376   7.7500   NaN        Q

[891 rows x 12 columns]
```

Extracting column names from the dataset

```
column_names = df.columns.tolist()
column_names
```

```
['PassengerId',
 'Survived',
 'Pclass',
 'Name',
 'Sex',
 'Age',
 'SibSp',
 'Parch',
 'Ticket',
 'Fare',
 'Cabin',
 'Embarked']
```

Converting all column names to lowercase

```
df_lower_cols = df.columns.str.lower()
df_lower_cols
```

```
Index(['passengerid', 'survived', 'pclass', 'name', 'sex', 'age',
'sibsp',
       'parch', 'ticket', 'fare', 'cabin', 'embarked'],
      dtype='object')
```

Removing any special characters from the column names.

```
# There were no column names with special charecters so we inserted
them
import random
special_chars = ['@', '#', '$', '%', '&', '*', '!', '?']
dfr=df
# Function to insert a random special character at a random position
in a string
def insert_random_special_char(col_name):
    char = random.choice(special_chars)
    pos = random.randint(0, len(col_name))
    return col_name[:pos] + char + col_name[pos:]
# Apply to all column names
dfr.columns= [insert_random_special_char(col) for col in dfr.columns]
dfr.columns
```

```
Index(['PassengerI&d', '*Survived', '$Pclass', 'Name@', 'Sex!', '?
Age',
       'Si$bSp', 'Pa@rch', 'Ti%cket', 'F&are', 'Cabin!', 'Embar#ked'],
      dtype='object')
```

```
dfr_remove_SC = dfr.columns.str.replace(r'[^A-Za-z0-9_]', '',
regex=True)
dfr.columns= dfr.columns.str.replace(r'[^A-Za-z0-9_]', '', regex=True)
dfr_remove_SC
```

```
Index(['PassengerId', 'Survived', 'Pclass', 'Name', 'Sex', 'Age',
'SibSp',
       'Parch', 'Ticket', 'Fare', 'Cabin', 'Embarked'],
      dtype='object')
```

Checking for missing values in the dataset

gathering the null values in form of 0's and 1's

```
# Here True(1) and False(0)
df.isna().astype(int)
```

```
     PassengerId  Survived  Pclass  Name  Sex  Age  SibSp  Parch
Ticket  \
0              0         0       0     0    0    0      0      0
0
1              0         0       0     0    0    0      0      0
0
2              0         0       0     0    0    0      0      0
0
3              0         0       0     0    0    0      0      0
0
4              0         0       0     0    0    0      0      0
0
..           ...       ...     ...   ...  ...  ...    ...    ...     .
```

```
..
886            0          0        0      0     0     0       0       0
0
887            0          0        0      0     0     0       0       0
0
888            0          0        0      0     0     1       0       0
0
889            0          0        0      0     0     0       0       0
0
890            0          0        0      0     0     0       0       0
0

     Fare  Cabin  Embarked
0       0      1         0
1       0      0         0
2       0      1         0
3       0      0         0
4       0      1         0
..    ...    ...       ...
886     0      1         0
887     0      0         0
888     0      1         0
889     0      0         0
890     0      1         0

[891 rows x 12 columns]
```

Treating or imputing missing values appropriately

```
print(df.isnull().sum())

df['Age'].fillna(df['Age'].mean(), inplace=True)
df['Cabin'].fillna('Unknown', inplace=True)
df['Embarked'].fillna(df['Embarked'].mode()[0], inplace=True)
print(df.isnull().sum())
```

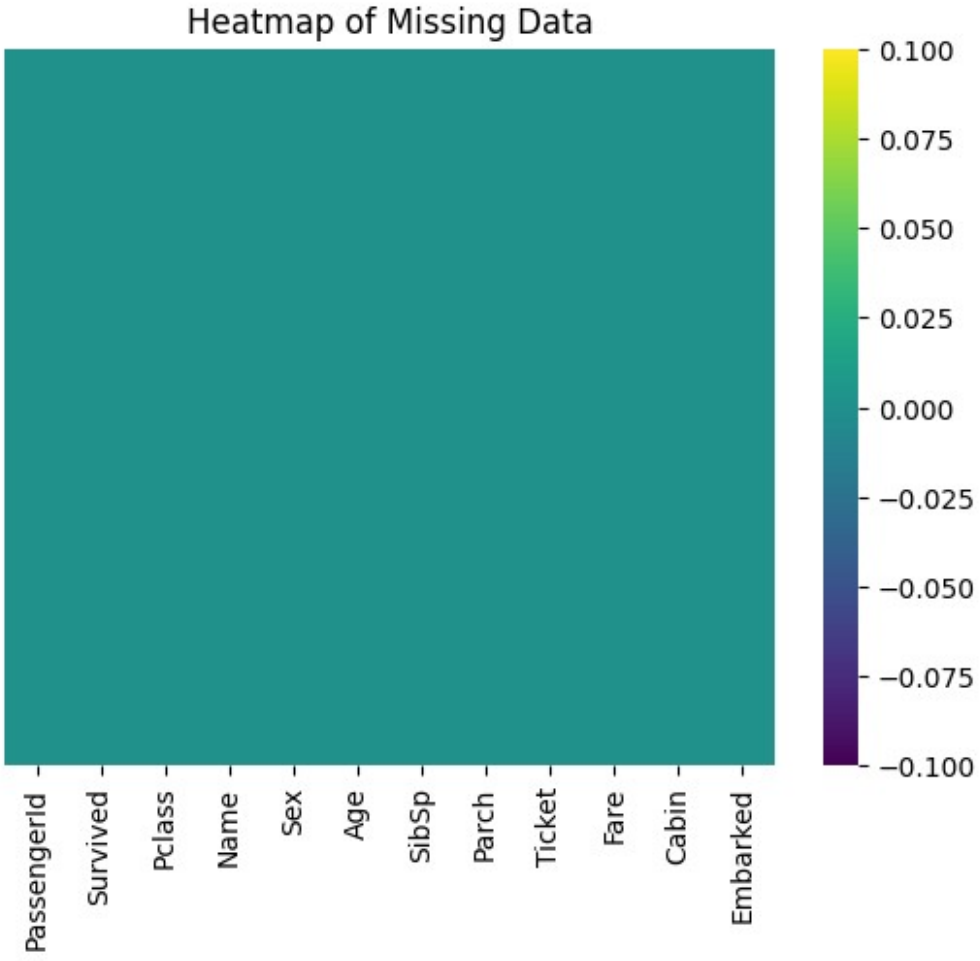
```
PassengerId      0
Survived         0
Pclass           0
Name             0
Sex              0
Age            177
SibSp            0
Parch            0
Ticket           0
Fare             0
Cabin          687
Embarked         2
dtype: int64
```

```
PassengerId    0
Survived       0
Pclass         0
Name           0
Sex            0
Age            0
SibSp          0
Parch          0
Ticket         0
Fare           0
Cabin          0
Embarked       0
dtype: int64

C:\Users\lilha\AppData\Local\Temp\ipykernel_26968\2086390062.py:3:
FutureWarning: A value is trying to be set on a copy of a DataFrame or
Series through chained assignment using an inplace method.
The behavior will change in pandas 3.0. This inplace method will never
work because the intermediate object on which we are setting values
always behaves as a copy.

For example, when doing 'df[col].method(value, inplace=True)', try
using 'df.method({col: value}, inplace=True)' or df[col] =
df[col].method(value) instead, to perform the operation inplace on the
original object.


  df['Age'].fillna(df['Age'].mean(), inplace=True)
C:\Users\lilha\AppData\Local\Temp\ipykernel_26968\2086390062.py:4:
FutureWarning: A value is trying to be set on a copy of a DataFrame or
Series through chained assignment using an inplace method.
The behavior will change in pandas 3.0. This inplace method will never
work because the intermediate object on which we are setting values
always behaves as a copy.

For example, when doing 'df[col].method(value, inplace=True)', try
using 'df.method({col: value}, inplace=True)' or df[col] =
df[col].method(value) instead, to perform the operation inplace on the
original object.


  df['Cabin'].fillna('Unknown', inplace=True)
C:\Users\lilha\AppData\Local\Temp\ipykernel_26968\2086390062.py:5:
FutureWarning: A value is trying to be set on a copy of a DataFrame or
Series through chained assignment using an inplace method.
The behavior will change in pandas 3.0. This inplace method will never
work because the intermediate object on which we are setting values
always behaves as a copy.

For example, when doing 'df[col].method(value, inplace=True)', try
```

```
using 'df.method({col: value}, inplace=True)' or df[col] =
df[col].method(value) instead, to perform the operation inplace on the
original object.


  df['Embarked'].fillna(df['Embarked'].mode()[0], inplace=True)
```

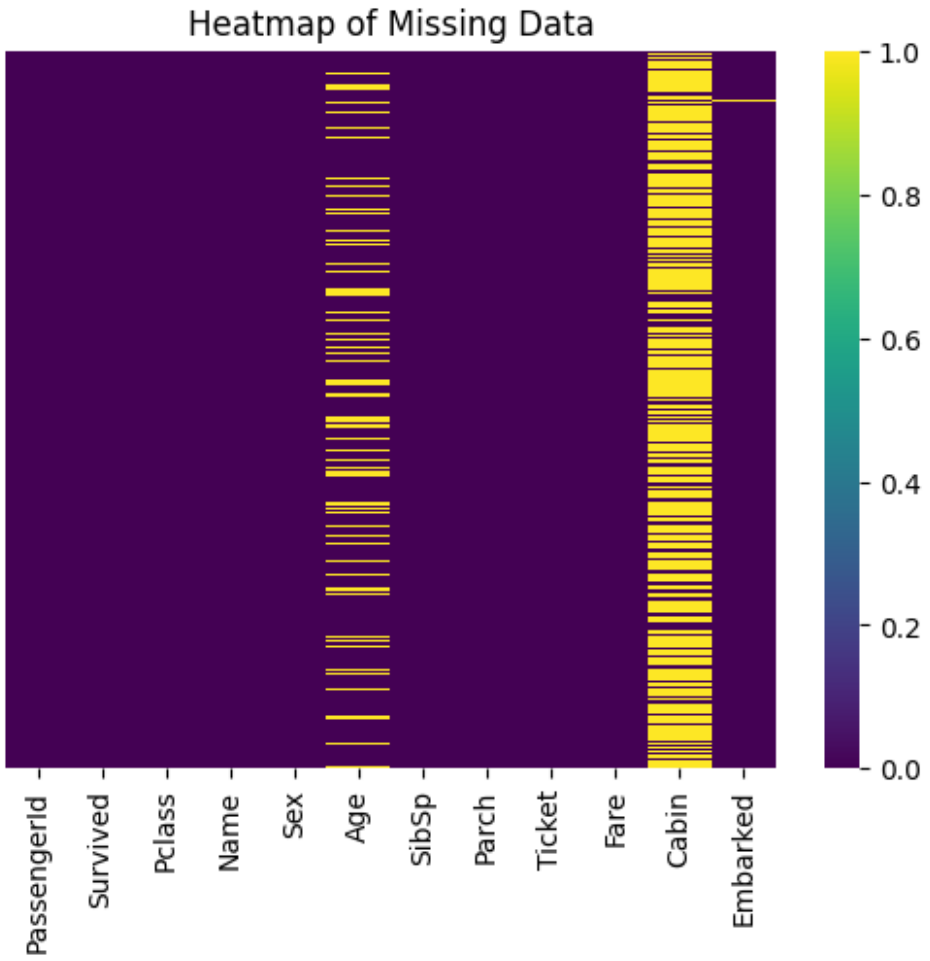
Visualizing cleaned data using a heatmap

```
import seaborn as sns
import matplotlib.pyplot as plt
sns.heatmap(df.isna(), cmap='viridis', cbar=True, yticklabels=False)
# Add a title
plt.title('Heatmap of Missing Data')
# Show the plot
plt.show()
```



Visualizing missing data using a heatmap

```
import seaborn as sns
import matplotlib.pyplot as plt
df1=pd.read_csv(file_path)
sns.heatmap(df1.isna(), cmap='viridis', cbar=True, yticklabels=False)
# Add a title
plt.title('Heatmap of Missing Data')
# Show the plot
plt.show()
```



Removing "Embarked" column because of no use and it also consist of NAN values

```
df = df.drop('Embarked', axis=1)
df
```

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

```
..           ...       ...     ...
886          887         0       2
887          888         1       1
888          889         0       3
889          890         1       1
890          891         0       3

                                                    Name     Sex
Age  \
0                                Braund, Mr. Owen Harris    male
22.000000
1    Cumings, Mrs. John Bradley (Florence Briggs Th...  female
38.000000
2                                 Heikkinen, Miss. Laina  female
26.000000
3         Futrelle, Mrs. Jacques Heath (Lily May Peel)  female
35.000000
4                               Allen, Mr. William Henry    male
35.000000
..                                                   ...     ...
...
886                               Montvila, Rev. Juozas    male
27.000000
887                        Graham, Miss. Margaret Edith  female
19.000000
888            Johnston, Miss. Catherine Helen "Carrie"  female
29.699118
889                               Behr, Mr. Karl Howell    male
26.000000
890                                 Dooley, Mr. Patrick    male
32.000000

     SibSp  Parch            Ticket     Fare    Cabin
0        1      0         A/5 21171   7.2500  Unknown
1        1      0          PC 17599  71.2833      C85
2        0      0  STON/O2. 3101282   7.9250  Unknown
3        1      0            113803  53.1000     C123
4        0      0            373450   8.0500  Unknown
..     ...    ...               ...      ...      ...
886      0      0            211536  13.0000  Unknown
887      0      0            112053  30.0000      B42
888      1      2        W./C. 6607  23.4500  Unknown
889      0      0            111369  30.0000     C148
890      0      0            370376   7.7500  Unknown

[891 rows x 11 columns]
```

Saving the cleaned and processed dataset for further use

```
df.to_csv("../Data/Cleaned Data/titanic - titanic.csv", index=False)
```

#Task 2

```
import janitor

Data2=pd.read_csv(file_path)

Data2 = (
    Data2
    .clean_names()  # converts to lowercase, snake_case, removes
special characters and spaces
)

print("Cleaned Column Names:", Data2.columns.to_list())
```

```
Cleaned Column Names: ['passengerid', 'survived', 'pclass', 'name',
'sex', 'age', 'sibsp', 'parch', 'ticket', 'fare', 'cabin', 'embarked']
```

```
missing_summary = Data2.isna().sum()
print("\nMissing values per column:\n", missing_summary)
```

```
Missing values per column:
 passengerid      0
survived         0
pclass           0
name             0
sex              0
age            177
sibsp            0
parch            0
ticket           0
fare             0
cabin          687
embarked         2
dtype: int64
```

```
for col in Data2.columns:
    if Data2[col].dtype == 'float64' or Data2[col].dtype == 'int64':
        Data2[col].fillna(Data2[col].median(), inplace=True)
    else:
        Data2[col].fillna("Unknown", inplace=True)
```

```
C:\Users\lilha\AppData\Local\Temp\ipykernel_26968\2914206462.py:3:
FutureWarning: A value is trying to be set on a copy of a DataFrame or
Series through chained assignment using an inplace method.
The behavior will change in pandas 3.0. This inplace method will never
work because the intermediate object on which we are setting values
always behaves as a copy.
```

```
For example, when doing 'df[col].method(value, inplace=True)', try
using 'df.method({col: value}, inplace=True)' or df[col] =
df[col].method(value) instead, to perform the operation inplace on the
original object.


  Data2[col].fillna(Data2[col].median(), inplace=True)
C:\Users\lilha\AppData\Local\Temp\ipykernel_26968\2914206462.py:3:
SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame

See the caveats in the documentation:
https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#
returning-a-view-versus-a-copy
  Data2[col].fillna(Data2[col].median(), inplace=True)
C:\Users\lilha\AppData\Local\Temp\ipykernel_26968\2914206462.py:3:
FutureWarning: A value is trying to be set on a copy of a DataFrame or
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The behavior will change in pandas 3.0. This inplace method will never
work because the intermediate object on which we are setting values
always behaves as a copy.

For example, when doing 'df[col].method(value, inplace=True)', try
using 'df.method({col: value}, inplace=True)' or df[col] =
df[col].method(value) instead, to perform the operation inplace on the
original object.


  Data2[col].fillna(Data2[col].median(), inplace=True)
C:\Users\lilha\AppData\Local\Temp\ipykernel_26968\2914206462.py:3:
SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame

See the caveats in the documentation:
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  Data2[col].fillna(Data2[col].median(), inplace=True)
C:\Users\lilha\AppData\Local\Temp\ipykernel_26968\2914206462.py:3:
FutureWarning: A value is trying to be set on a copy of a DataFrame or
Series through chained assignment using an inplace method.
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work because the intermediate object on which we are setting values
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For example, when doing 'df[col].method(value, inplace=True)', try
using 'df.method({col: value}, inplace=True)' or df[col] =
df[col].method(value) instead, to perform the operation inplace on the
original object.
```

```
  Data2[col].fillna(Data2[col].median(), inplace=True)
C:\Users\lilha\AppData\Local\Temp\ipykernel_26968\2914206462.py:3:
SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame

See the caveats in the documentation:
https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#
returning-a-view-versus-a-copy
  Data2[col].fillna(Data2[col].median(), inplace=True)
C:\Users\lilha\AppData\Local\Temp\ipykernel_26968\2914206462.py:5:
FutureWarning: A value is trying to be set on a copy of a DataFrame or
Series through chained assignment using an inplace method.
The behavior will change in pandas 3.0. This inplace method will never
work because the intermediate object on which we are setting values
always behaves as a copy.

For example, when doing 'df[col].method(value, inplace=True)', try
using 'df.method({col: value}, inplace=True)' or df[col] =
df[col].method(value) instead, to perform the operation inplace on the
original object.


  Data2[col].fillna("Unknown", inplace=True)
C:\Users\lilha\AppData\Local\Temp\ipykernel_26968\2914206462.py:5:
SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame

See the caveats in the documentation:
https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#
returning-a-view-versus-a-copy
  Data2[col].fillna("Unknown", inplace=True)
C:\Users\lilha\AppData\Local\Temp\ipykernel_26968\2914206462.py:3:
FutureWarning: A value is trying to be set on a copy of a DataFrame or
Series through chained assignment using an inplace method.
The behavior will change in pandas 3.0. This inplace method will never
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always behaves as a copy.

For example, when doing 'df[col].method(value, inplace=True)', try
using 'df.method({col: value}, inplace=True)' or df[col] =
df[col].method(value) instead, to perform the operation inplace on the
original object.


  Data2[col].fillna(Data2[col].median(), inplace=True)
C:\Users\lilha\AppData\Local\Temp\ipykernel_26968\2914206462.py:3:
SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame

See the caveats in the documentation:
```

```
https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy
  Data2[col].fillna(Data2[col].median(), inplace=True)
C:\Users\lilha\AppData\Local\Temp\ipykernel_26968\2914206462.py:3: FutureWarning: A value is trying to be set on a copy of a DataFrame or Series through chained assignment using an inplace method.
The behavior will change in pandas 3.0. This inplace method will never work because the intermediate object on which we are setting values always behaves as a copy.

For example, when doing 'df[col].method(value, inplace=True)', try using 'df.method({col: value}, inplace=True)' or df[col] = df[col].method(value) instead, to perform the operation inplace on the original object.


  Data2[col].fillna(Data2[col].median(), inplace=True)
C:\Users\lilha\AppData\Local\Temp\ipykernel_26968\2914206462.py:3: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy
  Data2[col].fillna(Data2[col].median(), inplace=True)
C:\Users\lilha\AppData\Local\Temp\ipykernel_26968\2914206462.py:3: FutureWarning: A value is trying to be set on a copy of a DataFrame or Series through chained assignment using an inplace method.
The behavior will change in pandas 3.0. This inplace method will never work because the intermediate object on which we are setting values always behaves as a copy.

For example, when doing 'df[col].method(value, inplace=True)', try using 'df.method({col: value}, inplace=True)' or df[col] = df[col].method(value) instead, to perform the operation inplace on the original object.


  Data2[col].fillna(Data2[col].median(), inplace=True)
C:\Users\lilha\AppData\Local\Temp\ipykernel_26968\2914206462.py:3: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy
  Data2[col].fillna(Data2[col].median(), inplace=True)
C:\Users\lilha\AppData\Local\Temp\ipykernel_26968\2914206462.py:5: FutureWarning: A value is trying to be set on a copy of a DataFrame or Series through chained assignment using an inplace method.
```

```
The behavior will change in pandas 3.0. This inplace method will never
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always behaves as a copy.

For example, when doing 'df[col].method(value, inplace=True)', try
using 'df.method({col: value}, inplace=True)' or df[col] =
df[col].method(value) instead, to perform the operation inplace on the
original object.


  Data2[col].fillna("Unknown", inplace=True)
C:\Users\lilha\AppData\Local\Temp\ipykernel_26968\2914206462.py:5:
SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame

See the caveats in the documentation:
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returning-a-view-versus-a-copy
  Data2[col].fillna("Unknown", inplace=True)
C:\Users\lilha\AppData\Local\Temp\ipykernel_26968\2914206462.py:3:
FutureWarning: A value is trying to be set on a copy of a DataFrame or
Series through chained assignment using an inplace method.
The behavior will change in pandas 3.0. This inplace method will never
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For example, when doing 'df[col].method(value, inplace=True)', try
using 'df.method({col: value}, inplace=True)' or df[col] =
df[col].method(value) instead, to perform the operation inplace on the
original object.


  Data2[col].fillna(Data2[col].median(), inplace=True)
C:\Users\lilha\AppData\Local\Temp\ipykernel_26968\2914206462.py:3:
SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame

See the caveats in the documentation:
https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#
returning-a-view-versus-a-copy
  Data2[col].fillna(Data2[col].median(), inplace=True)
C:\Users\lilha\AppData\Local\Temp\ipykernel_26968\2914206462.py:5:
FutureWarning: A value is trying to be set on a copy of a DataFrame or
Series through chained assignment using an inplace method.
The behavior will change in pandas 3.0. This inplace method will never
work because the intermediate object on which we are setting values
always behaves as a copy.

For example, when doing 'df[col].method(value, inplace=True)', try
using 'df.method({col: value}, inplace=True)' or df[col] =
```
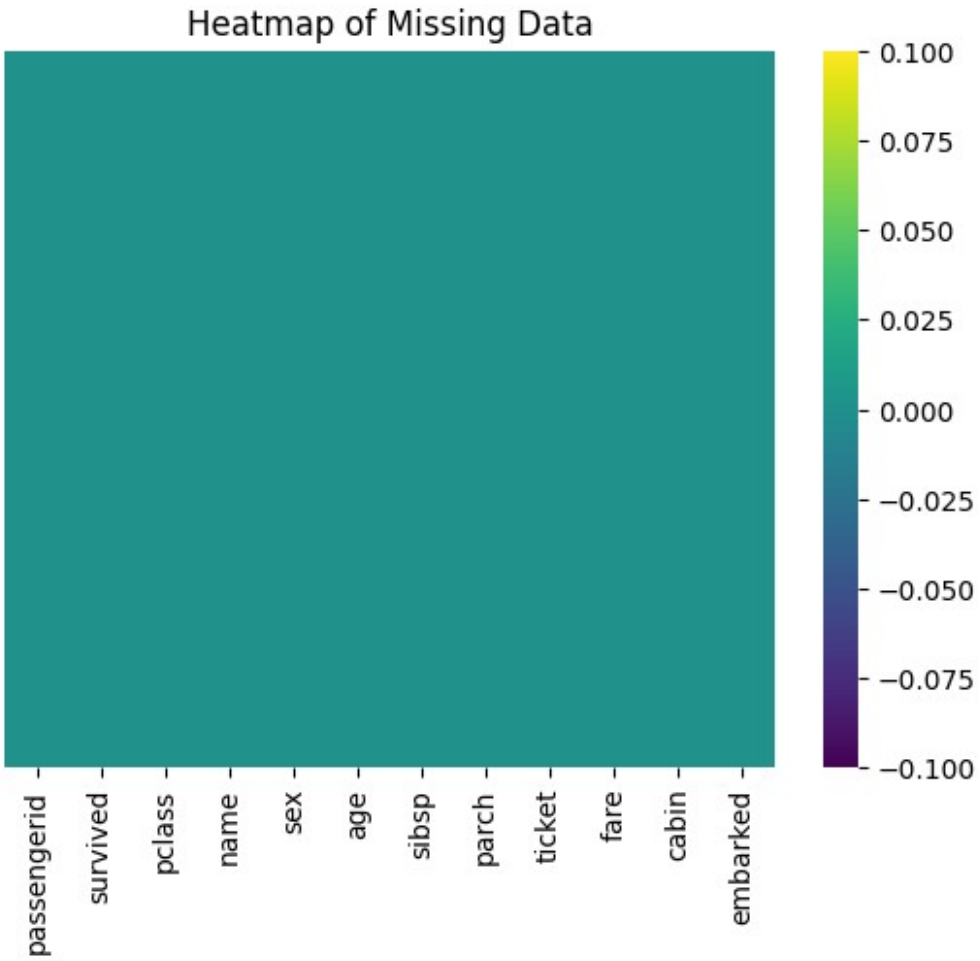

```
df[col].method(value) instead, to perform the operation inplace on the
original object.


  Data2[col].fillna("Unknown", inplace=True)
C:\Users\lilha\AppData\Local\Temp\ipykernel_26968\2914206462.py:5:
SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame

See the caveats in the documentation:
https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#
returning-a-view-versus-a-copy
  Data2[col].fillna("Unknown", inplace=True)
```

```
#plt.figure(figsize=(12, 6))
sns.heatmap(Data2.isna(), cbar=True, cmap='viridis',
yticklabels=False)
plt.title("Heatmap of Missing Data")
plt.show()
```



```
Data2 = Data2.remove_columns(['embarked'])
```

```
c:\Users\lilha\OneDrive\Pictures\Desktop\5th-sem-Practicals\DA
Practicals\VirtualEnviorment\Lib\site-packages\pandas_flavor\
register.py:164: FutureWarning: This function will be deprecated in a
1.x release. Please use `pd.DataFrame.drop` instead.
  return method(self._obj, *args, **kwargs)
```

```
Data2.to_csv("../Data/Cleaned Data/Task_2_titanic.csv", index=False)
```