TITANIC SURVIVAL PREDICTIVE ANALYSIS

In [240]:
```
from PIL import Image
import matplotlib.pyplot as plt
a=Image.open("D:\Data Analytics Project\Titanic Survival Prediction Dataset/HLBVqQzy.jpg")
fig,ax = plt.subplots(figsize=(10,10))
ax.imshow(a)
ax.axis('off')
plt.subplots_adjust(left=0,right=1,top=1,bottom=0)
plt.show()
```

In [1]:
```
import pandas as pd
```

In [2]:
```
data = pd.read_csv("D:\Data Analytics Project\Titanic Survival Prediction Dataset/Titanic-Dataset.csv"
```

In [ ]:
```

```

1. DATAPREPROCESSING

In [3]:
```
data.head(10)
```

Out[3]:

	PassengerId	Survived	Pclass	Name	Sex	Age	SibSp	Parch	Ticket	Fare	Cabin	Embarked
0	1	0	3	Braund, Mr. Owen Harris	male	22.0	1	0	A/5 21171	7.2500	NaN	S
1	2	1	1	Cumings, Mrs. John Bradley (Florence Briggs Th...	female	38.0	1	0	PC 17599	71.2833	C85	C
2	3	1	3	Heikkinen, Miss. Laina	female	26.0	0	0	STON/O2. 3101282	7.9250	NaN	S
3	4	1	1	Futrelle, Mrs. Jacques Heath (Lily May Peel)	female	35.0	1	0	113803	53.1000	C123	S
4	5	0	3	Allen, Mr. William Henry	male	35.0	0	0	373450	8.0500	NaN	S
5	6	0	3	Moran, Mr. James	male	NaN	0	0	330877	8.4583	NaN	Q
6	7	0	1	McCarthy, Mr. Timothy J	male	54.0	0	0	17463	51.8625	E46	S
7	8	0	3	Palsson, Master. Gosta Leonard	male	2.0	3	1	349909	21.0750	NaN	S
8	9	1	3	Johnson, Mrs. Oscar W (Elisabeth Vilhelmina Berg)	female	27.0	0	2	347742	11.1333	NaN	S
9	10	1	2	Nasser, Mrs. Nicholas (Adele Achem)	female	14.0	1	0	237736	30.0708	NaN	C

In [4]:
```
data.tail(10)
```

Out[4]:

	PassengerId	Survived	Pclass	Name	Sex	Age	SibSp	Parch	Ticket	Fare	Cabin	Embarked
881	882	0	3	Markun, Mr. Johann	male	33.0	0	0	349257	7.8958	NaN	S
882	883	0	3	Dahlberg, Miss. Gerda Ulrika	female	22.0	0	0	7552	10.5167	NaN	S
883	884	0	2	Banfield, Mr. Frederick James	male	28.0	0	0	C.A./SOTON 34068	10.5000	NaN	S
884	885	0	3	Sutehall, Mr. Henry Jr	male	25.0	0	0	SOTON/OQ 392076	7.0500	NaN	S
885	886	0	3	Rice, Mrs. William (Margaret Norton)	female	39.0	0	5	382652	29.1250	NaN	Q
886	887	0	2	Montvila, Rev. Juozas	male	27.0	0	0	211536	13.0000	NaN	S
887	888	1	1	Graham, Miss. Margaret Edith	female	19.0	0	0	112053	30.0000	B42	S
888	889	0	3	Johnston, Miss. Catherine Helen "Carrie"	female	NaN	1	2	W./C. 6607	23.4500	NaN	S
889	890	1	1	Behr, Mr. Karl Howell	male	26.0	0	0	111369	30.0000	C148	C
890	891	0	3	Dooley, Mr. Patrick	male	32.0	0	0	370376	7.7500	NaN	Q

In [5]:
```
# Domain type of the columns
data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 891 entries, 0 to 890
Data columns (total 12 columns):
 #   Column       Non-Null Count  Dtype  
---  ------       --------------  -----  
 0   PassengerId  891 non-null    int64  
 1   Survived     891 non-null    int64  
 2   Pclass       891 non-null    int64  
 3   Name         891 non-null    object 
 4   Sex          891 non-null    object 
 5   Age          714 non-null    float64
 6   SibSp        891 non-null    int64  
 7   Parch        891 non-null    int64  
 8   Ticket       891 non-null    object 
 9   Fare         891 non-null    float64
 10  Cabin        204 non-null    object 
 11  Embarked     889 non-null    object 
dtypes: float64(2), int64(5), object(5)
memory usage: 83.7+ KB
```

In [6]:
```
# Description of the table
data.describe()
```

Out[6]:

	PassengerId	Survived	Pclass	Age	SibSp	Parch	Fare
count	891.000000	891.000000	891.000000	714.000000	891.000000	891.000000	891.000000
mean	446.000000	0.383838	2.308642	29.699118	0.523008	0.381594	32.204208
std	257.353842	0.486592	0.836071	14.526497	1.102743	0.806057	49.693429
min	1.000000	0.000000	1.000000	0.420000	0.000000	0.000000	0.000000
25%	223.500000	0.000000	2.000000	20.125000	0.000000	0.000000	7.910400
50%	446.000000	0.000000	3.000000	28.000000	0.000000	0.000000	14.454200
75%	668.500000	1.000000	3.000000	38.000000	1.000000	0.000000	31.000000
max	891.000000	1.000000	3.000000	80.000000	8.000000	6.000000	512.329200

In [8]:
```
# Size of the Table
print('Size of the table:')
print('No.of Rows:',data.shape[0],'\nNo.of Columns:',data.shape[1])
```

```
Size of the table:
No.of Rows: 891
No.of Columns: 12
```

In [7]:
```
# Checking null values
data.isnull().sum()
```

Out[7]:
```
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
```

1 (a) Drop Column

In [13]:
```
# Since Age and Cabin has massive missing values , so drop it

data=data.drop(columns=['Age','Cabin'])
data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 891 entries, 0 to 890
Data columns (total 10 columns):
 #   Column       Non-Null Count  Dtype
---  ------       --------------  -----
 0   PassengerId  891 non-null    int64
 1   Survived     891 non-null    int64
 2   Pclass       891 non-null    int64
 3   Name         891 non-null    object
 4   Sex          891 non-null    object
 5   SibSp        891 non-null    int64
 6   Parch        891 non-null    int64
 7   Ticket       891 non-null    object
 8   Fare         891 non-null    float64
 9   Embarked     889 non-null    object
dtypes: float64(1), int64(5), object(4)
memory usage: 69.7+ KB
```

In [15]:
```
# Now Drop the rows having null values
data.dropna(inplace=True)
data.isnull().sum() # Checking after handled with null values
```

Out[15]:
```
PassengerId    0
Survived       0
Pclass         0
Name           0
Sex            0
SibSp          0
Parch          0
Ticket         0
Fare           0
Embarked       0
dtype: int64
```

In [18]:
```
# Survived =>  0 - Died , 1 - Survived
# Pclass ( Passenger Class ) => 1=1st class, 2=2nd class, 3=3rd class
# Embarked => C = Cherbourg, Q = Queenstown, S = Southampton
# SibSp - No. of Siblings or Spouses
# Parch - No. of Parents or Children
```

1 (b) Renaming Column

In [19]:
```
# Renaming columns
data.rename(columns={'Pclass':'Passenger Class','SibSp':'Siblings/Spouse','Parch':'Parents/Children'},
data.columns
```

Out[19]:
```
Index(['PassengerId', 'Survived', 'Passenger Class', 'Name', 'Sex',
       'Siblings/Spouse', 'Parents/Children', 'Ticket', 'Fare', 'Embarked'],
      dtype='object')
```

1 (c) Replacing values or objects

In [38]:
```
# Replacing 0-Died, 1-Survived
data['Survived'] = data['Survived'].replace({0:'Died',1:'Survived'})
print('Survived','\n',data['Survived'].value_counts())
```

```
Survived
 Died        549
Survived    340
Name: Survived, dtype: int64
```

In [35]:
```
# Replacing Passenger Class
data['Passenger Class'] = data['Passenger Class'].replace({1:'1st class',2:'2nd class',3:'3rd class'})
print(data.groupby('Passenger Class').size())
```

```
Passenger Class
1st class    214
2nd class    184
3rd class    491
dtype: int64
```

In [42]:
```
# Repalcing Embarked column
data['Embarked'] = data['Embarked'].replace({'C':'Cherbourg','Q':'Queenstown','S':'Southampton'})
print(data.groupby('Embarked').size())
```

```
Embarked
Cherbourg      168
Queenstown      77
Southampton    644
dtype: int64
```

In [39]:
```
data['Siblings/Spouse'].value_counts()
```

Out[39]:
```
0    606
1    209
2     28
4     18
3     16
8      7
5      5
Name: Siblings/Spouse, dtype: int64
```

In [41]:
```
data.groupby('Parents/Children').size()
```

Out[41]:
```
Parents/Children
0    676
1    118
2     80
3      5
4      4
5      5
6      1
dtype: int64
```

1 (d) Changing datatype of the column

In [43]:
```
# Changing Fare Paid column to integer type
data['Fare'] = data['Fare'].astype(int)
data['Fare'].info()
```

```
<class 'pandas.core.series.Series'>
Int64Index: 889 entries, 0 to 890
Series name: Fare
Non-Null Count  Dtype
--------------  -----
889 non-null    int32
dtypes: int32(1)
memory usage: 10.4 KB
```

1 (e) Final Preview of the Data

In [45]:
```
data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 889 entries, 0 to 890
Data columns (total 9 columns):
 #   Column            Non-Null Count  Dtype
---  ------            --------------  -----
 0   PassengerId       889 non-null    int64
 1   Survived          889 non-null    object
 2   Passenger Class   889 non-null    object
 3   Name              889 non-null    object
 4   Sex               889 non-null    object
 5   Siblings/Spouse   889 non-null    int64
 6   Parents/Children  889 non-null    int64
 7   Fare              889 non-null    int32
 8   Embarked          889 non-null    object
dtypes: int32(1), int64(3), object(5)
memory usage: 66.0+ KB
```

In [46]:
```
data.head()
```

Out[46]:

	PassengerId	Survived	Passenger Class	Name	Sex	Siblings/Spouse	Parents/Children	Fare	Embarked
0	1	Died	3rd class	Braund, Mr. Owen Harris	male	1	0	7	Southampton
1	2	Survived	1st class	Cumings, Mrs. John Bradley (Florence Briggs Th...	female	1	0	71	Cherbourg
2	3	Survived	3rd class	Heikkinen, Miss. Laina	female	0	0	7	Southampton
3	4	Survived	1st class	Futrelle, Mrs. Jacques Heath (Lily May Peel)	female	1	0	53	Southampton
4	5	Died	3rd class	Allen, Mr. William Henry	male	0	0	8	Southampton

In [47]:
```
data.tail(5)
```

Out[47]:

	PassengerId	Survived	Passenger Class	Name	Sex	Siblings/Spouse	Parents/Children	Fare	Embarked
886	887	Died	2nd class	Montvila, Rev. Juozas	male	0	0	13	Southampton
887	888	Survived	1st class	Graham, Miss. Margaret Edith	female	0	0	30	Southampton
888	889	Died	3rd class	Johnston, Miss. Catherine Helen "Carrie"	female	1	2	23	Southampton
889	890	Survived	1st class	Behr, Mr. Karl Howell	male	0	0	30	Cherbourg
890	891	Died	3rd class	Dooley, Mr. Patrick	male	0	0	7	Queenstown

2. DATA VISUALIZATION AND EDA

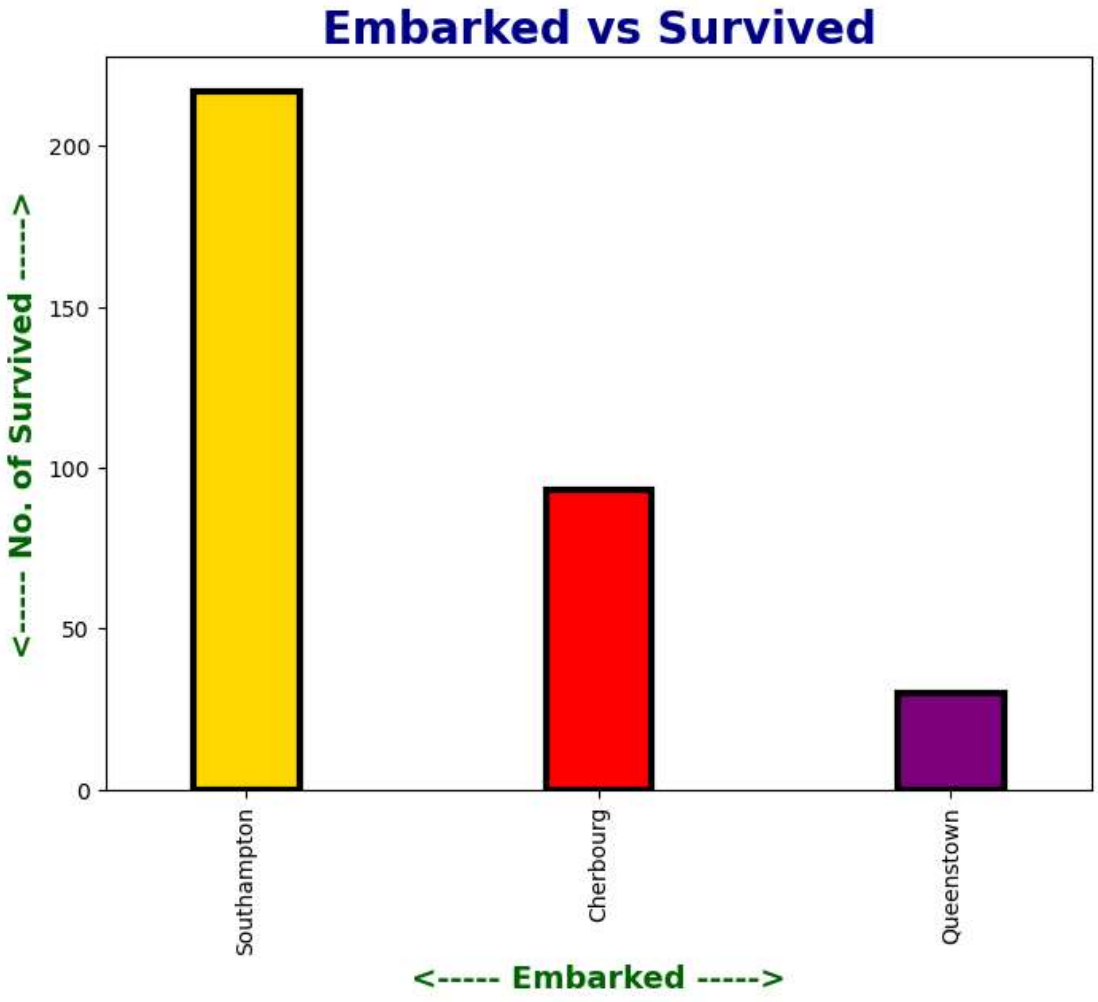
In [48]:
```
import matplotlib.pyplot as plt
import seaborn as sns
```

(i) Embarked vs Survived

In [216]:
```
# Embarked vs Survived
data_survived = data[data['Survived'] == 'Survived']
embarked_survived = data_survived['Embarked'].value_counts()
print('Survived by Embarked ')
print(embarked_survived)
print('Total no.of surived over Embarked:',sum(embarked_survived))
```

```
Survived by Embarked
Southampton    217
Cherbourg       93
Queenstown      30
Name: Embarked, dtype: int64
Total no.of surived over Embarked: 340
```

In [218]:
```
# Plot
plt.figure(figsize=(8,6))
embarked_survived.plot.bar(color=['gold','red','purple'],edgecolor='black',linewidth=3,width=0.3)
plt.title('Embarked vs Survived',fontsize=20,fontweight='bold',color='darkblue')
plt.xlabel('<----- Embarked ----->',fontsize=14,color='darkgreen',fontweight='bold')
plt.ylabel('<----- No. of Survived ----->',fontsize=14,color='darkgreen',fontweight='bold')
plt.show()
```

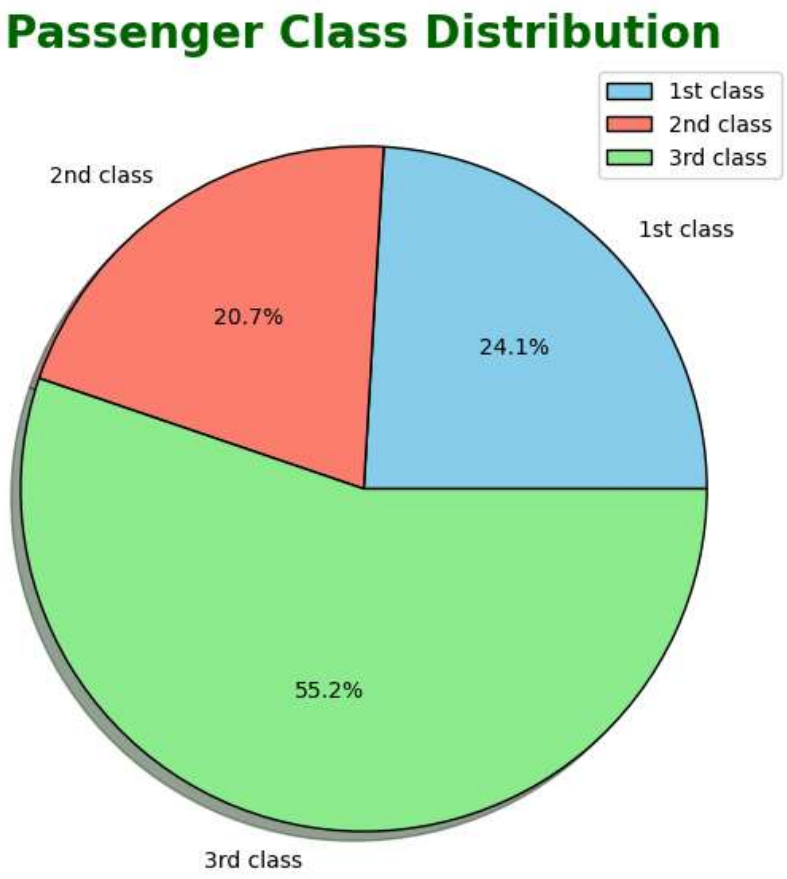


(ii) Passenger Class Distribution

In [213]:
```
# Passenger Class Distribution
pass_class = data.groupby('Passenger Class').size()
print(pass_class)
print('Total Passenger:',sum(pass_class))
```

```
Passenger Class
1st class    214
2nd class    184
3rd class    491
dtype: int64
Total Passenger: 889
```

In [215]:
```
# Plot
plt.figure(figsize=(7,7))
pass_class.plot.pie(labels=pass_class.index,autopct="%1.1f%%",colors=['skyblue','salmon','lightgreen']
                    ,wedgeprops={'edgecolor':'black'},shadow=True)
plt.title('Passenger Class Distribution',fontsize=20,fontweight='bold',color='darkgreen')
plt.legend()
plt.show()
```

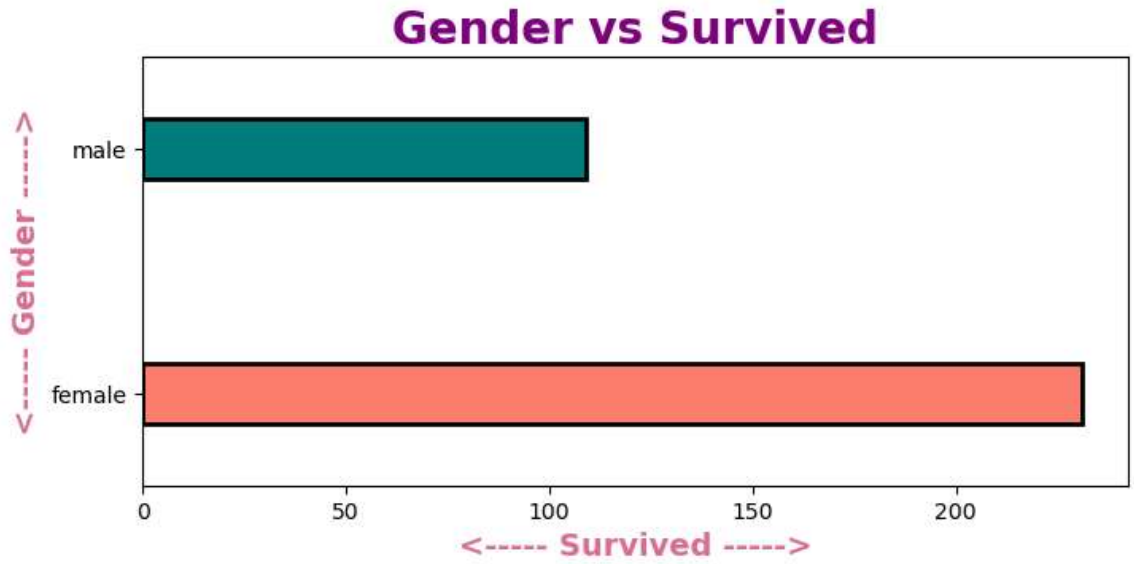


(iii) Gender vs Survived

In [211]:
```
# Survived
survived_data = data[data['Survived'] == 'Survived']
surv_by_sex = survived_data['Sex'].value_counts()
print('Survived Ratio')
print(surv_by_sex)
print('No.of Survived:',sum(surv_by_sex))
```

```
Survived Ratio
female    231
male      109
Name: Sex, dtype: int64
No.of Survived: 340
```

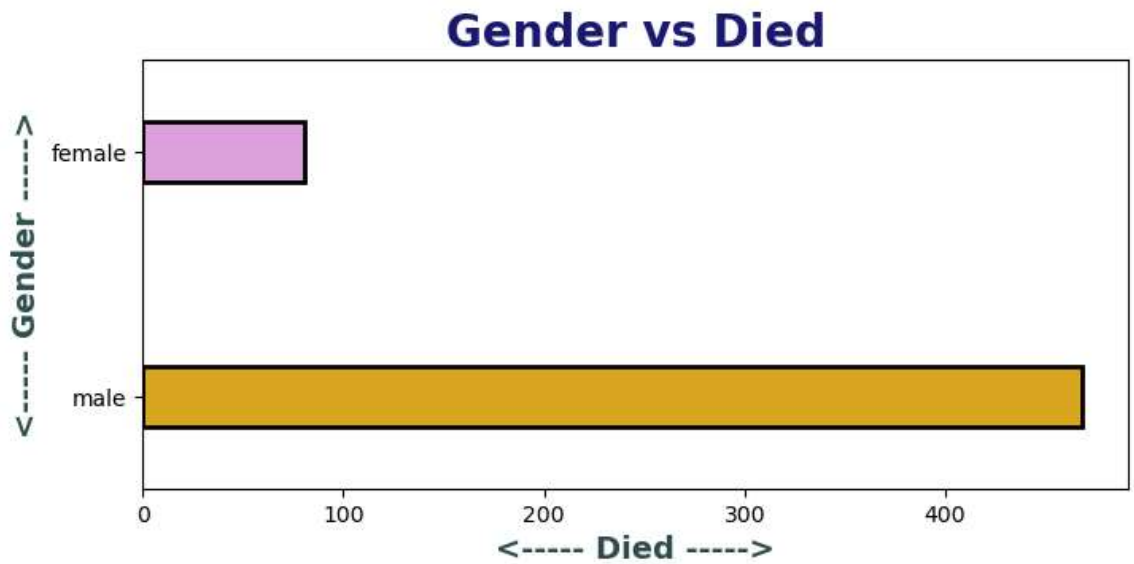
In [229]:
```
plt.figure(figsize=(8,3.5))
surv_by_sex.plot.barh(color=['salmon','teal'],edgecolor='black',width=0.25,linewidth=2)
plt.title('Gender vs Survived',fontsize=20,fontweight='bold',color='purple')
plt.xlabel('<----- Survived ----->',fontsize=14,fontweight='bold',color='palevioletred')
plt.ylabel('<----- Gender ----->',fontsize=14,fontweight='bold',color='palevioletred')
plt.show()
```



In [210]:
```
# Died
died_data = data[data['Survived'] == 'Died']
died_by_sex = died_data['Sex'].value_counts()
print('Died Ratio')
print(died_by_sex)
print('No.of Died:',sum(died_by_sex))
```

```
Died Ratio
male      468
female     81
Name: Sex, dtype: int64
No.of Died: 549
```

In [228]:
```
# Plot
plt.figure(figsize=(8,3.5))
died_by_sex.plot.barh(color=['goldenrod','plum'],edgecolor='black',width=0.25,linewidth=2)
plt.title('Gender vs Died',fontsize=20,fontweight='bold',color='midnightblue')
plt.xlabel('<----- Died ----->',fontsize=14,fontweight='bold',color='darkslategrey')
plt.ylabel('<----- Gender ----->',fontsize=14,fontweight='bold',color='darkslategrey')
plt.show()
```



(iv) Fare Paid Distribution

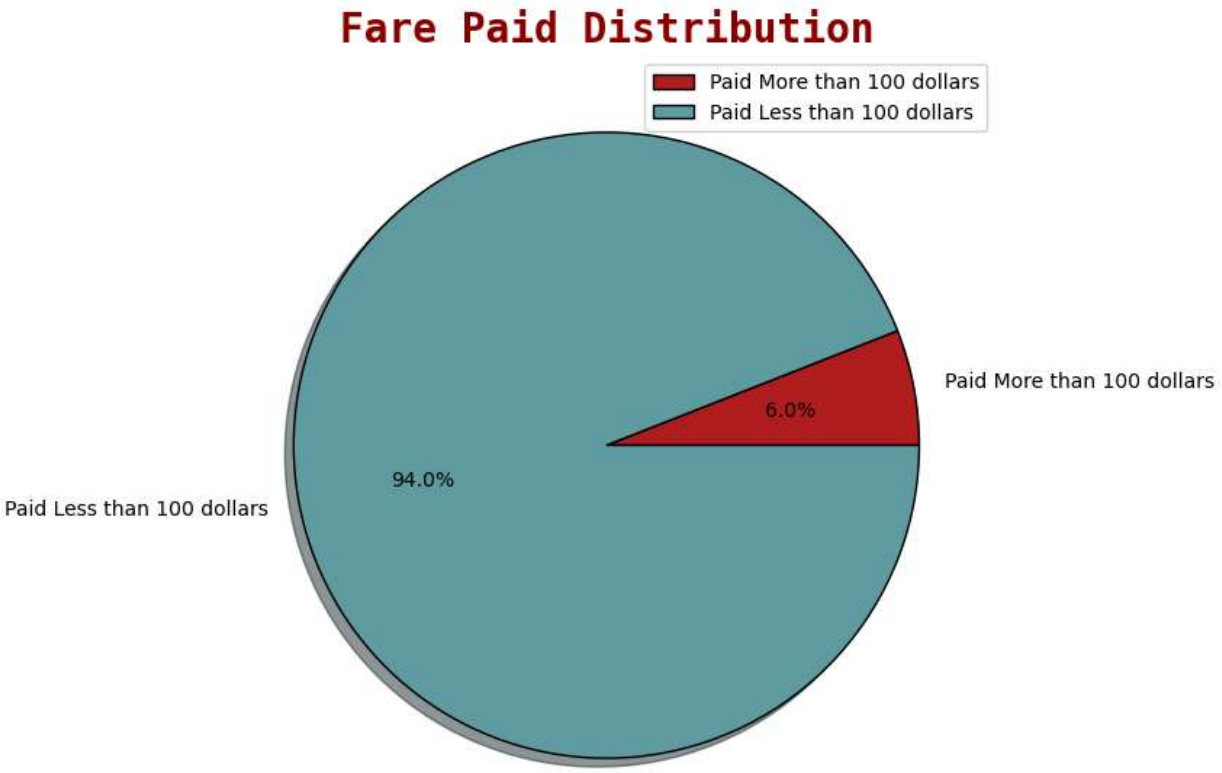
In [205]:
```
# Fare Paid more than 100
above_200 = data[data['Fare'] > 100].value_counts().sum()
print('Amount Paid more than $100:',above_200,'Passengers')

# Fare Paid less than 100
below_200 = data[data['Fare'] <= 100].value_counts().sum()
print('Amount Paid less than $100:',below_200,'Passengers')

# Max Pay
print('Max Amount Paid in the Ship:',max(data['Fare']))
```

```
Amount Paid more than $100: 53 Passengers
Amount Paid less than $100: 836 Passengers
Max Amount Paid in the Ship: 512
```

In [206]:
```
# Pie plot
labels = ['Paid More than 100 dollars','Paid Less than 100 dollars']
sizes = [above_200,below_200]
colors = ['firebrick','cadetblue']
plt.figure(figsize=(7,7))
plt.pie(sizes,labels=labels,colors=colors,autopct='%1.1f%%',shadow=True,wedgeprops={'edgecolor':'black
plt.title('Fare Paid Distribution',fontsize=20,fontweight='bold',color='darkred',fontname='monospace')
plt.legend()
plt.show()
```

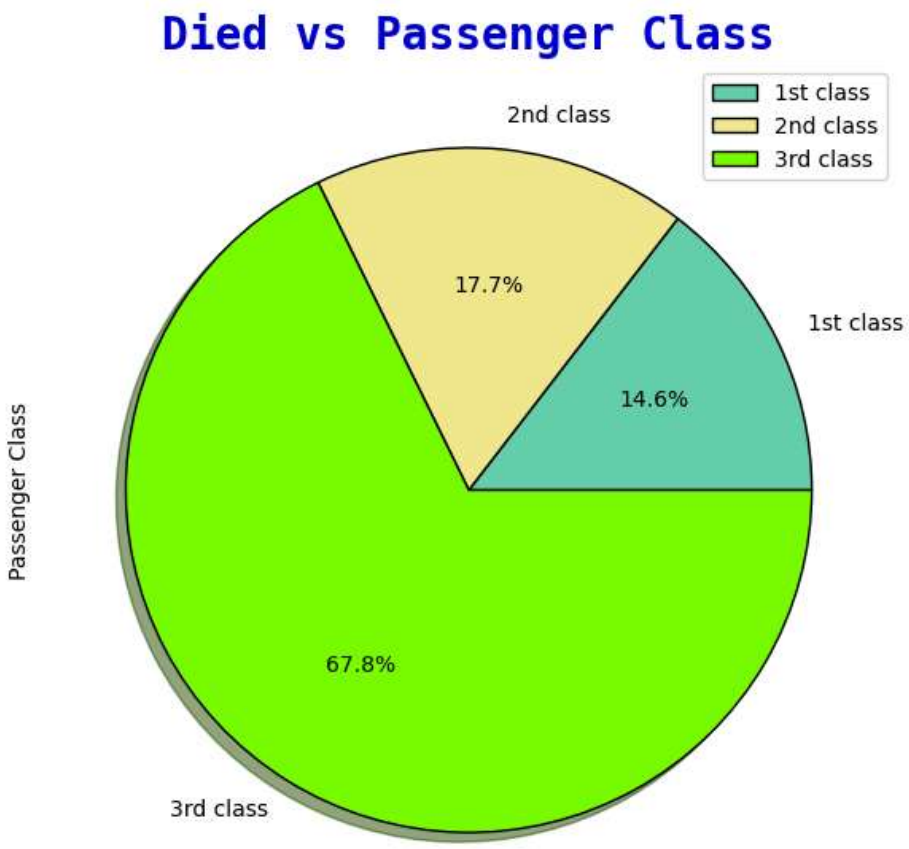


(v) Died vs Passenger Class

In [203]:
```
# Died vs Passenger Class
died_data = data[data['Survived'] == 'Died']
died_by_class = died_data['Passenger Class'].value_counts().sort_values()
print('Passenger Died over Class:')
print(died_by_class)
print('Total No.of Died:',sum(died_by_class))
```

```
Passenger Died over Class:
1st class     80
2nd class     97
3rd class    372
Name: Passenger Class, dtype: int64
Total No.of Died: 549
```

In [204]:
```
# Pie plot
colors=['mediumaquamarine','khaki','lawngreen']
plt.figure(figsize=(7,7))
died_by_class.plot.pie(colors=colors,autopct="%1.1f%%",shadow=True,wedgeprops={'edgecolor':'black'})
plt.title('Died vs Passenger Class',fontsize=20,color='mediumblue',fontweight='bold',fontname='monospa
plt.legend()
plt.show()
```



(vi) Embarked vs Died

In [199]:
```
# Embarked vs Died
data_died = data[data['Survived'] == 'Died']
embarked_died = data_died['Embarked'].value_counts()
print('No. of Died over Emabarked')
print(embarked_died)
print('Total No. of Died over Embarked:',sum(embarked_died))
```

```
No. of Died over Emabarked
Southampton    427
Cherbourg       75
Queenstown      47
Name: Embarked, dtype: int64
Total No. of Died over Embarked: 549
```

In [227]:
```
# Plot the data
plt.figure(figsize=(8,4))
embarked_died.plot.barh(color=['mediumvioletred','seagreen','gold'],edgecolor='black',width=0.3,linewi
plt.title('Embarked vs Died',fontweight='bold',fontsize=20,color='saddlebrown',fontname='monospace')
plt.xlabel('<----- No.of Died ----->',fontsize=14,fontweight='bold',color='darkmagenta')
plt.ylabel('<----- Embarked ----->',fontsize=14,fontweight='bold',color='darkmagenta')
plt.show()
```