In [1]:

```python
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt

from warnings import filterwarnings
filterwarnings(action='ignore')
```

In [2]:

```python
pd.set_option('display.max_columns',10,'display.width',1000)
train = pd.read_csv('C:\\Users\\dheek\\Downloads\\train.csv')
test = pd.read_csv('C:\\Users\\dheek\\Downloads\\test.csv')
train.head()
```

Out[2]:

	PassengerId	Survived	Pclass	Name	Sex	...	Parch	Ticket	Fare	Cabin	Embarked
0	1	0	3	Braund, Mr. Owen Harris	male	...	0	A/5 21171	7.2500	NaN	S
1	2	1	1	Cumings, Mrs. John Bradley (Florence Briggs Th...	female	...	0	PC 17599	71.2833	C85	C
2	3	1	3	Heikkinen, Miss. Laina	female	...	0	STON/O2. 3101282	7.9250	NaN	S
3	4	1	1	Futrelle, Mrs. Jacques Heath (Lily May Peel)	female	...	0	113803	53.1000	C123	S
4	5	0	3	Allen, Mr. William Henry	male	...	0	373450	8.0500	NaN	S

5 rows × 12 columns

In [3]:

```python
train.shape
```

Out[3]:

```
(891, 12)
```

In [4]:

```python
test.shape
```

Out[4]:

```
(418, 11)
```

In [5]:

```
train.isnull().sum()
```

Out[5]:

```
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
```

In [6]:

```
test.isnull().sum()
```

Out[6]:

```
PassengerId      0
Pclass           0
Name             0
Sex              0
Age             86
SibSp            0
Parch            0
Ticket           0
Fare             1
Cabin          327
Embarked         0
dtype: int64
```

In [7]:

```
train.describe(include="all")
```

Out[7]:

	PassengerId	Survived	Pclass	Name	Sex	...	Parch	Ticket	Fare	Cabin	Embarked
count	891.000000	891.000000	891.000000	891	891	...	891.000000	891	891.000000	204	889
unique	NaN	NaN	NaN	891	2	...	NaN	681	NaN	147	3
top	NaN	NaN	NaN	Braund, Mr. Owen Harris	male	...	NaN	347082	NaN	B96 B98	S
freq	NaN	NaN	NaN	1	577	...	NaN	7	NaN	4	644
mean	446.000000	0.383838	2.308642	NaN	NaN	...	0.381594	NaN	32.204208	NaN	NaN
std	257.353842	0.486592	0.836071	NaN	NaN	...	0.806057	NaN	49.693429	NaN	NaN
min	1.000000	0.000000	1.000000	NaN	NaN	...	0.000000	NaN	0.000000	NaN	NaN
25%	223.500000	0.000000	2.000000	NaN	NaN	...	0.000000	NaN	7.910400	NaN	NaN
50%	446.000000	0.000000	3.000000	NaN	NaN	...	0.000000	NaN	14.454200	NaN	NaN
75%	668.500000	1.000000	3.000000	NaN	NaN	...	0.000000	NaN	31.000000	NaN	NaN
max	891.000000	1.000000	3.000000	NaN	NaN	...	6.000000	NaN	512.329200	NaN	NaN

11 rows × 12 columns

In [8]:

```python
import numpy as np
numeric_columns =train.select_dtypes (include=[np.number]).columns
train[numeric_columns].groupby('Survived').mean()
```

Out[8]:

	PassengerId	Pclass	Age	SibSp	Parch	Fare
Survived						
0	447.016393	2.531876	30.626179	0.553734	0.329690	22.117887
1	444.368421	1.950292	28.343690	0.473684	0.464912	48.395408

In [9]:

```python
import numpy as np
numeric_columns= train.select_dtypes (include=[np.number])
```

```
correlation_matrix= numeric_columns.corr()
correlation_matrix
```

Out[9]:

	PassengerId	Survived	Pclass	Age	SibSp	Parch	Fare
PassengerId	1.000000	-0.005007	-0.035144	0.036847	-0.057527	-0.001652	0.012658
Survived	-0.005007	1.000000	-0.338481	-0.077221	-0.035322	0.081629	0.257307
Pclass	-0.035144	-0.338481	1.000000	-0.369226	0.083081	0.018443	-0.549500
Age	0.036847	-0.077221	-0.369226	1.000000	-0.308247	-0.189119	0.096067
SibSp	-0.057527	-0.035322	0.083081	-0.308247	1.000000	0.414838	0.159651
Parch	-0.001652	0.081629	0.018443	-0.189119	0.414838	1.000000	0.216225
Fare	0.012658	0.257307	-0.549500	0.096067	0.159651	0.216225	1.000000

In [10]:

```
male_ind = len(train[train['Sex'] == 'male'])
print("No of Males in Titanic:",male_ind)
```

```
No of Males in Titanic: 577
```

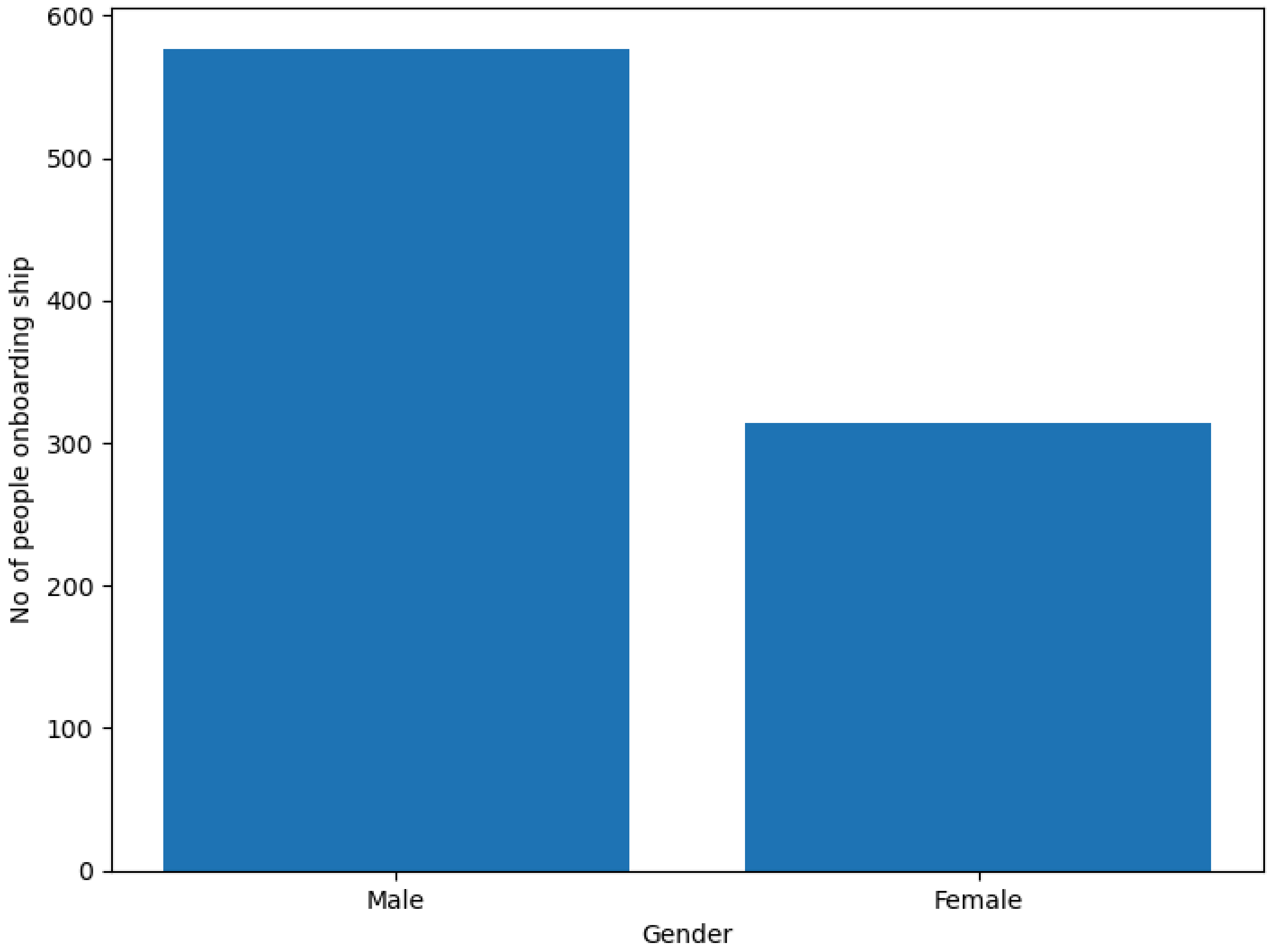
In [11]:

```
female_ind = len(train[train['Sex'] == 'female'])
print("No of Females in Titanic:",female_ind)
```

```
No of Females in Titanic: 314
```

In [12]:

```
fig = plt.figure()
ax = fig.add_axes([0,0,1,1])
gender = ['Male','Female']
index = [577,314]
ax.bar(gender,index)
plt.xlabel("Gender")
plt.ylabel("No of people onboarding ship")
plt.show()
```



In [13]:
```
alive = len(train[train['Survived'] == 1])
dead = len(train[train['Survived'] == 0])
```

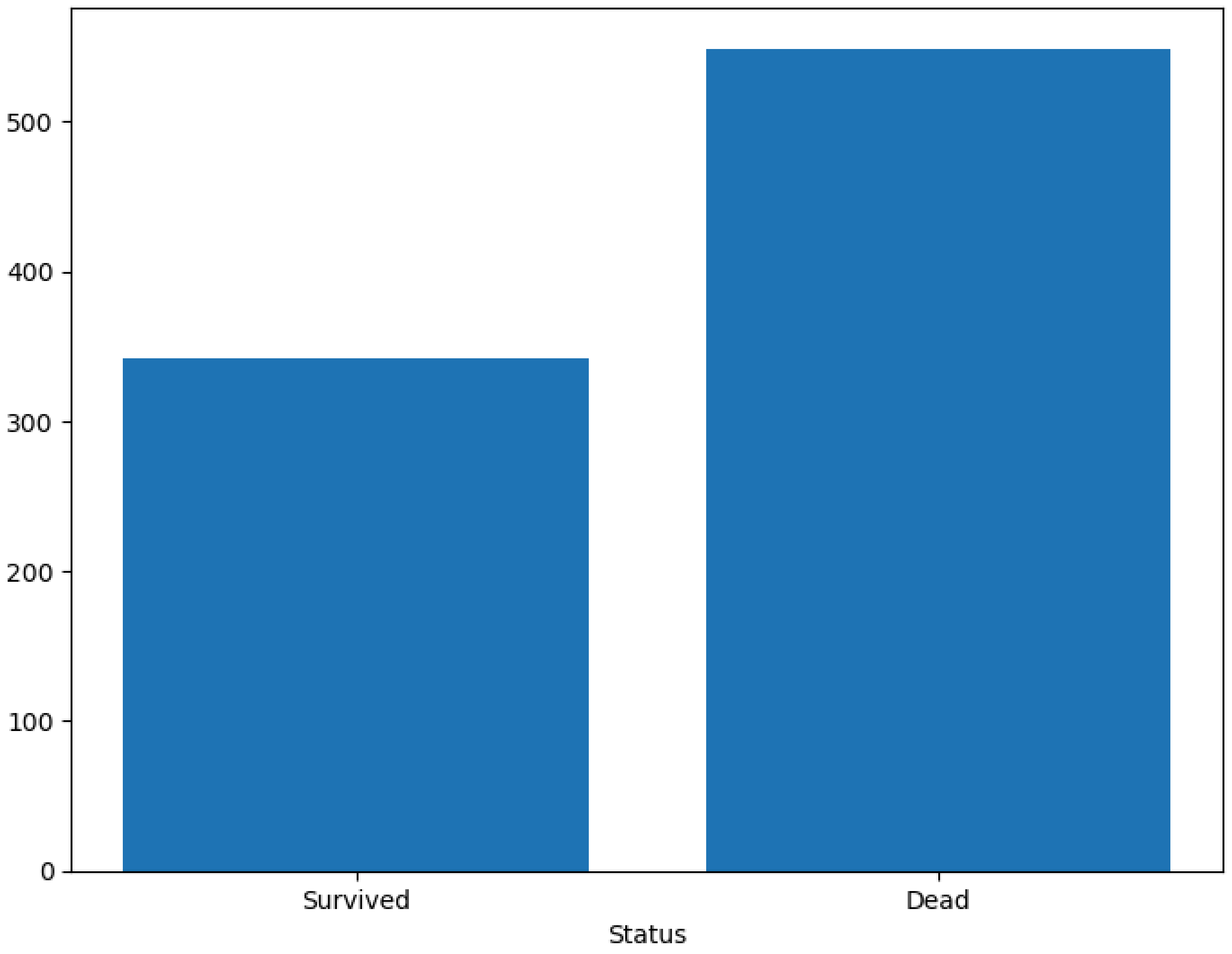
In [14]:
```
train.groupby('Sex')[['Survived']].mean()
```

Out[14]:

	Survived
Sex	
female	0.742038
male	0.188908

In [15]:

```
fig = plt.figure()
ax = fig.add_axes([0,0,1,1])
status = ['Survived','Dead']
ind = [alive,dead]
ax.bar(status,ind)
plt.xlabel("Status")
plt.show()
```



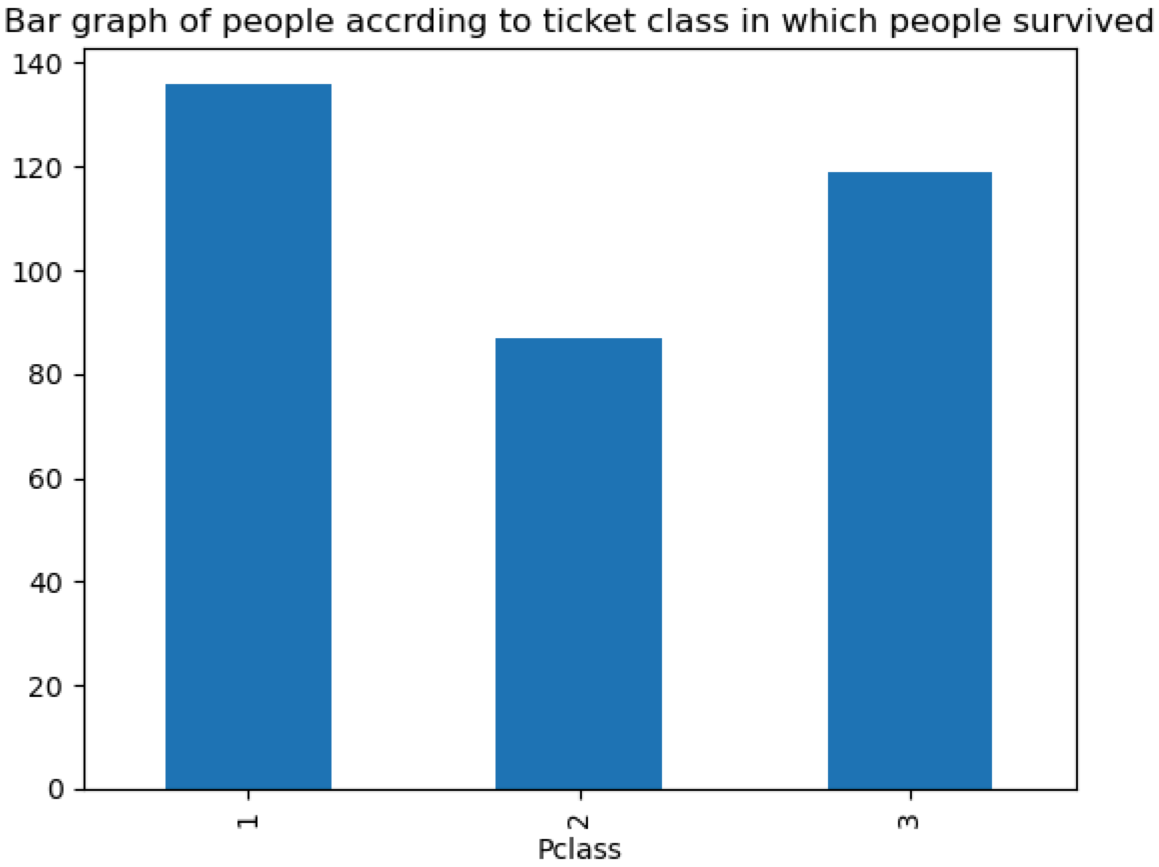
In [16]:

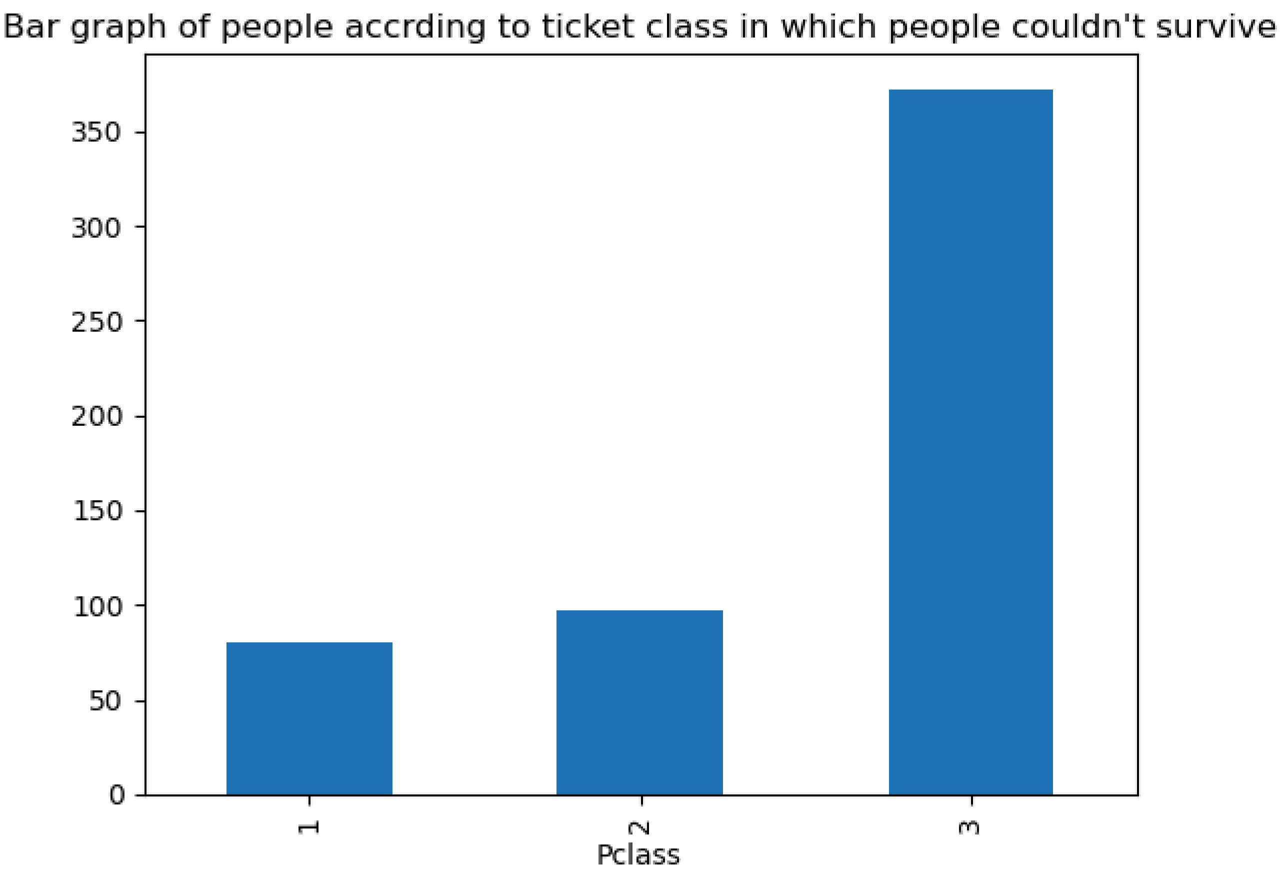
```
plt.figure(1)
train.loc[train['Survived'] == 1, 'Pclass'].value_counts().sort_index().plot.bar()
plt.title('Bar graph of people accrding to ticket class in which people survived')


plt.figure(2)
```

```
train.loc[train['Survived'] == 0, 'Pclass'].value_counts().sort_index().plot.bar()
plt.title('Bar graph of people accrding to ticket class in which people couldn\'t survive')
```

```
Out[16]:  Text(0.5, 1.0, "Bar graph of people accrding to ticket class in which people couldn't survive")
```



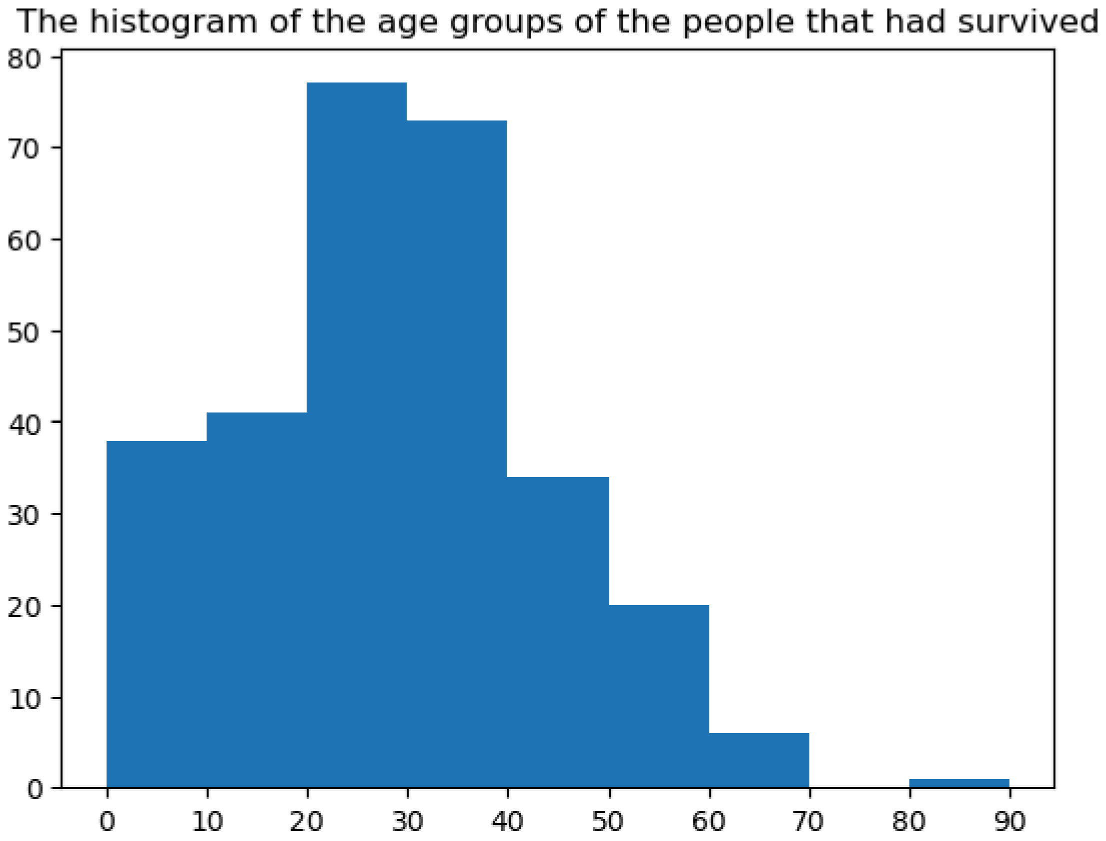


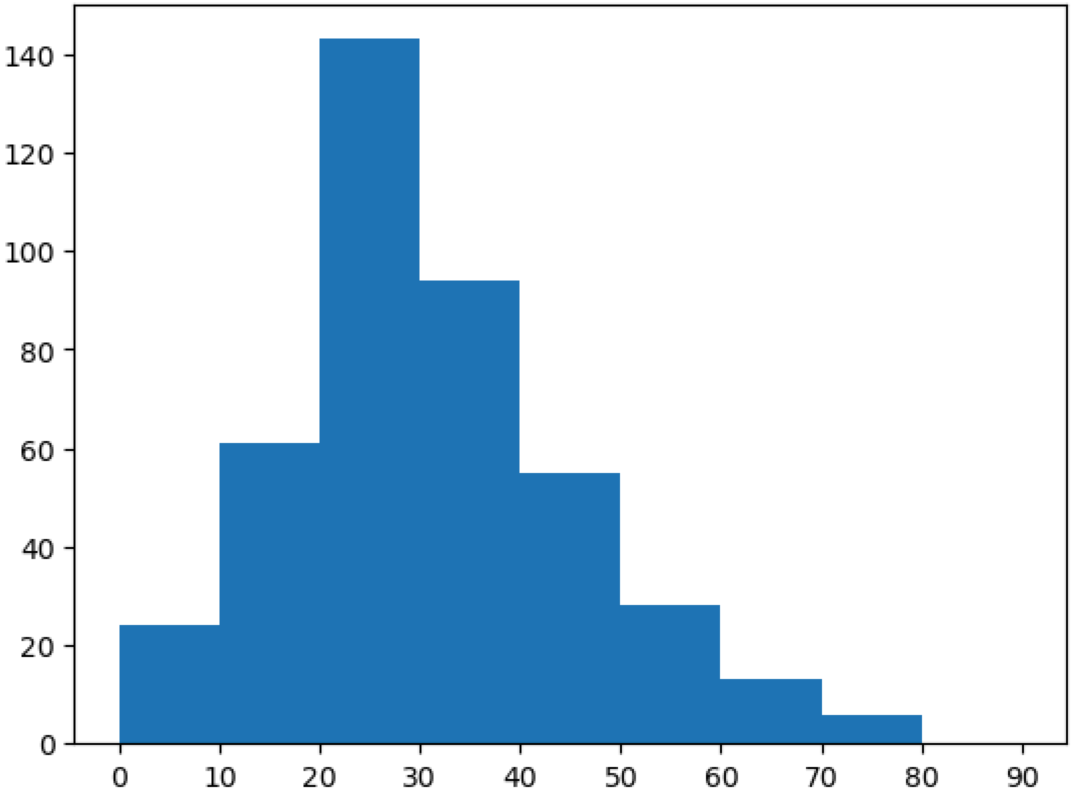
In [17]:

```
plt.figure(1)
age  = train.loc[train.Survived == 1, 'Age']
plt.title('The histogram of the age groups of the people that had survived')
plt.hist(age, np.arange(0,100,10))
plt.xticks(np.arange(0,100,10))


plt.figure(2)
age  = train.loc[train.Survived == 0, 'Age']
plt.title('The histogram of the age groups of the people that coudn\'t survive')
plt.hist(age, np.arange(0,100,10))
plt.xticks(np.arange(0,100,10))
```

```
Out[17]:  ([<matplotlib.axis.XTick at 0x1988028c810>,
            <matplotlib.axis.XTick at 0x198803da990>,
            <matplotlib.axis.XTick at 0x198803b04d0>,
            <matplotlib.axis.XTick at 0x19880417090>,
            <matplotlib.axis.XTick at 0x19880419310>,
            <matplotlib.axis.XTick at 0x1988041b590>,
            <matplotlib.axis.XTick at 0x19880415d50>,
            <matplotlib.axis.XTick at 0x19880426610>,
            <matplotlib.axis.XTick at 0x1988042c790>,
            <matplotlib.axis.XTick at 0x1988042e710>],
           [Text(0, 0, '0'),
            Text(10, 0, '10'),
            Text(20, 0, '20'),
            Text(30, 0, '30'),
            Text(40, 0, '40'),
            Text(50, 0, '50'),
            Text(60, 0, '60'),
            Text(70, 0, '70'),
            Text(80, 0, '80'),
            Text(90, 0, '90')])
```


The histogram of the age groups of the people that had survived
80
70
60
50
40
30
20
10
0
0
10
20
30
40
50
60
70
80
90



The histogram of the age groups of the people that coudn't survive

In [18]:

```
train[["SibSp", "Survived"]].groupby(['SibSp'], as_index=False).mean().sort_values(by='Survived', ascending=False)
```

Out[18]:

	SibSp	Survived
1	1	0.535885
2	2	0.464286
0	0	0.345395
3	3	0.250000
4	4	0.166667
5	5	0.000000
6	8	0.000000

In [19]:

```
train[["Pclass", "Survived"]].groupby(['Pclass'], as_index=False).mean().sort_values(by='Survived', ascending=False)
```

Out[19]:

	Pclass	Survived
0	1	0.629630
1	2	0.472826
2	3	0.242363

In [20]:

```
train[["Age", "Survived"]].groupby(['Age'], as_index=False).mean().sort_values(by='Age', ascending=True)
```

Out[20]:

	Age	Survived
0	0.42	1.0
1	0.67	1.0
2	0.75	1.0
3	0.83	1.0
4	0.92	1.0
...	...	...
83	70.00	0.0
84	70.50	0.0
85	71.00	0.0
86	74.00	0.0
87	80.00	1.0

88 rows × 2 columns

In [21]:

```
train[["Embarked", "Survived"]].groupby(['Embarked'], as_index=False).mean().sort_values(by='Survived', ascending=False)
```

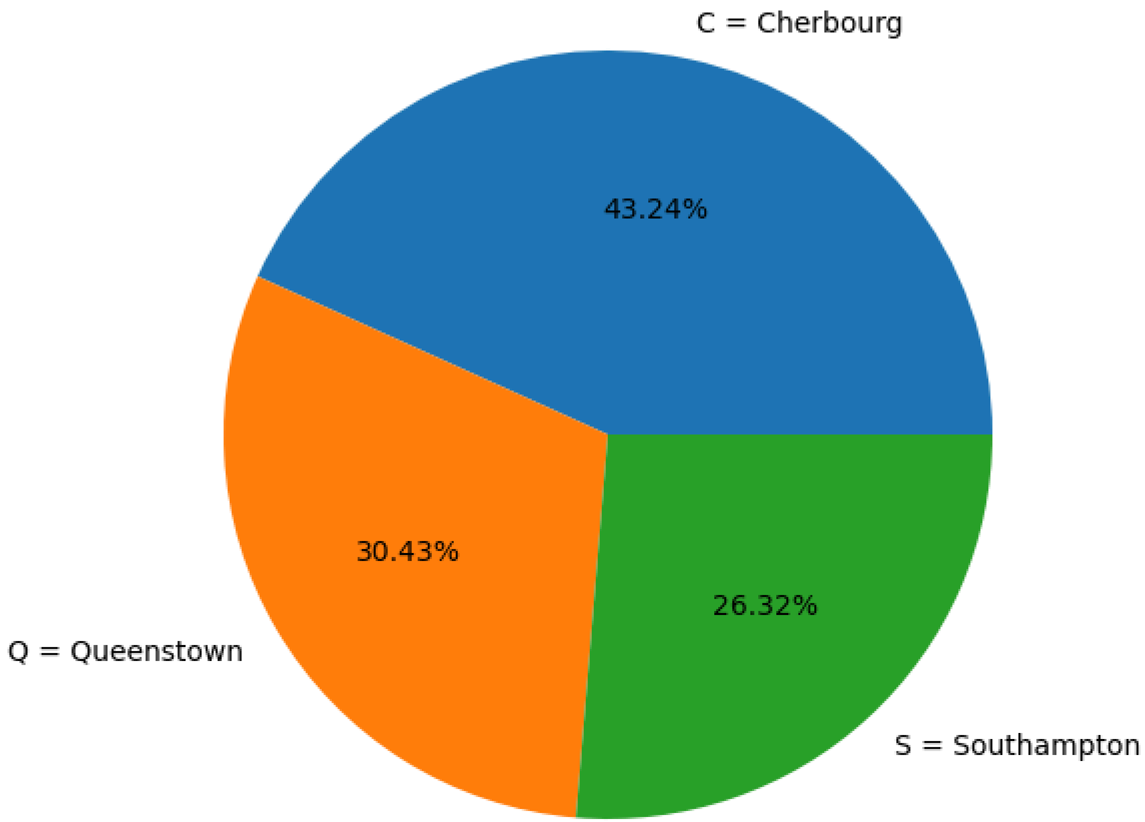
Out[21]:

	Embarked	Survived
0	C	0.553571
1	Q	0.389610
2	S	0.336957

In [22]:

```
fig = plt.figure()
ax = fig.add_axes([0,0,1,1])
ax.axis('equal')
l = ['C = Cherbourg', 'Q = Queenstown', 'S = Southampton']
s = [0.553571,0.389610,0.336957]
```

```
ax.pie(s, labels = l,autopct='%1.2f%%')
plt.show()
```



In [23]:

```
test.describe(include="all")
```

Out[23]:

	PassengerId	Pclass	Name	Sex	Age	...	Parch	Ticket	Fare	Cabin	Embarked
count	418.000000	418.000000	418	418	332.000000	...	418.000000	418	417.000000	91	418
unique	NaN	NaN	418	2	NaN	...	NaN	363	NaN	76	3
top	NaN	NaN	Kelly, Mr. James	male	NaN	...	NaN	PC 17608	NaN	B57 B59 B63 B66	S
freq	NaN	NaN	1	266	NaN	...	NaN	5	NaN	3	270
mean	1100.500000	2.265550	NaN	NaN	30.272590	...	0.392344	NaN	35.627188	NaN	NaN
std	120.810458	0.841838	NaN	NaN	14.181209	...	0.981429	NaN	55.907576	NaN	NaN
min	892.000000	1.000000	NaN	NaN	0.170000	...	0.000000	NaN	0.000000	NaN	NaN
25%	996.250000	1.000000	NaN	NaN	21.000000	...	0.000000	NaN	7.895800	NaN	NaN
50%	1100.500000	3.000000	NaN	NaN	27.000000	...	0.000000	NaN	14.454200	NaN	NaN
75%	1204.750000	3.000000	NaN	NaN	39.000000	...	0.000000	NaN	31.500000	NaN	NaN
max	1309.000000	3.000000	NaN	NaN	76.000000	...	9.000000	NaN	512.329200	NaN	NaN

11 rows × 11 columns

In [24]:

```
train = train.drop(['Ticket'], axis = 1)
test = test.drop(['Ticket'], axis = 1)
```

In [25]:

```
train = train.drop(['Cabin'], axis = 1)
test = test.drop(['Cabin'], axis = 1)
```

In [26]:

```
train = train.drop(['Name'], axis = 1)
test = test.drop(['Name'], axis = 1)
```

In [27]:

```
column_train=['Age','Pclass','SibSp','Parch','Fare','Sex','Embarked']
#training values
X=train[column_train]
#target value
Y=train['Survived']
```

In [28]:

```
X['Age'].isnull().sum()
X['Pclass'].isnull().sum()
X['SibSp'].isnull().sum()
X['Parch'].isnull().sum()
X['Fare'].isnull().sum()
X['Sex'].isnull().sum()
X['Embarked'].isnull().sum()
```

Out[28]:

```
2
```

In [29]:

```
X['Age']=X['Age'].fillna(X['Age'].median())
X['Age'].isnull().sum()
```

Out[29]:

```
0
```

In [30]:

```
X['Embarked'] = train['Embarked'].fillna(method ='pad')
X['Embarked'].isnull().sum()
0
```

Out[30]:

```
0
```

In [31]:

```
d={'male':0, 'female':1}
X['Sex']=X['Sex'].apply(lambda x:d[x])
X['Sex'].head()
```

Out[31]:

```
0    0
1    1
2    1
3    1
4    0
Name: Sex, dtype: int64
```

In [32]:

```
e={'C':0, 'Q':1 ,'S':2}
X['Embarked']=X['Embarked'].apply(lambda x:e[x])
X['Embarked'].head()
```

```
Out[32]: 0    2
         1    0
         2    2
         3    2
         4    2
         Name: Embarked, dtype: int64
```

```
In [33]: from sklearn.model_selection import train_test_split
         X_train, X_test, Y_train, Y_test = train_test_split(X,Y,test_size=0.3,random_state=7)
```

```
In [34]: from sklearn.linear_model import LogisticRegression
         model = LogisticRegression()
         model.fit(X_train,Y_train)
         Y_pred = model.predict(X_test)

         from sklearn.metrics import accuracy_score
         print("Accuracy Score:",accuracy_score(Y_test,Y_pred))
```

```
Accuracy Score: 0.7611940298507462
```

```
In [35]: from sklearn.metrics import accuracy_score,confusion_matrix
         confusion_mat = confusion_matrix(Y_test,Y_pred)
         print(confusion_mat)
```

```
[[131  25]
 [ 39  73]]
```

```
In [36]: from sklearn.svm import SVC
         model1 = SVC()
         model1.fit(X_train,Y_train)

         pred_y = model1.predict(X_test)

         from sklearn.metrics import accuracy_score
         print("Acc=",accuracy_score(Y_test,pred_y))
```

```
Acc= 0.6604477611940298
```

```
In [37]: from sklearn.metrics import accuracy_score,confusion_matrix,classification_report
         confusion_mat = confusion_matrix(Y_test,pred_y)
```

```
print(confusion_mat)
print(classification_report(Y_test,pred_y))
```

```
[[149   7]
 [ 84  28]]
              precision    recall  f1-score   support

           0       0.64      0.96      0.77       156
           1       0.80      0.25      0.38       112

    accuracy                           0.66       268
   macro avg       0.72      0.60      0.57       268
weighted avg       0.71      0.66      0.61       268
```

In [38]:

```
from sklearn.neighbors import KNeighborsClassifier
model2 = KNeighborsClassifier(n_neighbors=5)
model2.fit(X_train,Y_train)
y_pred2 = model2.predict(X_test)

from sklearn.metrics import accuracy_score
print("Accuracy Score:",accuracy_score(Y_test,y_pred2))
```

```
Accuracy Score: 0.6604477611940298
```

In [39]:

```
from sklearn.metrics import accuracy_score,confusion_matrix,classification_report
confusion_mat = confusion_matrix(Y_test,y_pred2)
print(confusion_mat)
print(classification_report(Y_test,y_pred2))
```

```
[[127  29]
 [ 62  50]]
              precision    recall  f1-score   support

           0       0.67      0.81      0.74       156
           1       0.63      0.45      0.52       112

    accuracy                           0.66       268
   macro avg       0.65      0.63      0.63       268
weighted avg       0.66      0.66      0.65       268
```

In [40]:

```
from sklearn.naive_bayes import GaussianNB
model3 = GaussianNB()
model3.fit(X_train,Y_train)
y_pred3 = model3.predict(X_test)

from sklearn.metrics import accuracy_score
print("Accuracy Score:",accuracy_score(Y_test,y_pred3))
```

```
Accuracy Score: 0.7686567164179104
```

In [41]:

```
from sklearn.metrics import accuracy_score,confusion_matrix,classification_report
confusion_mat = confusion_matrix(Y_test,y_pred3)
print(confusion_mat)
print(classification_report(Y_test,y_pred3))
```

```
[[129  27]
 [ 35  77]]
              precision    recall  f1-score   support

           0       0.79      0.83      0.81       156
           1       0.74      0.69      0.71       112

    accuracy                           0.77       268
   macro avg       0.76      0.76      0.76       268
weighted avg       0.77      0.77      0.77       268
```

In [42]:

```
from sklearn.tree import DecisionTreeClassifier
model4 = DecisionTreeClassifier(criterion='entropy',random_state=7)
model4.fit(X_train,Y_train)
y_pred4 = model4.predict(X_test)

from sklearn.metrics import accuracy_score
print("Accuracy Score:",accuracy_score(Y_test,y_pred4))
```

```
Accuracy Score: 0.7425373134328358
```

In [43]:

```
from sklearn.metrics import accuracy_score,confusion_matrix,classification_report
confusion_mat = confusion_matrix(Y_test,y_pred4)
print(confusion_mat)
print(classification_report(Y_test,y_pred4))
```

```
[[132  24]
 [ 45  67]]
              precision    recall  f1-score   support

           0       0.75      0.85      0.79       156
           1       0.74      0.60      0.66       112

    accuracy                           0.74       268
   macro avg       0.74      0.72      0.73       268
weighted avg       0.74      0.74      0.74       268
```

In [44]:

```
results = pd.DataFrame({
    'Model': ['Logistic Regression','Support Vector Machines', 'Naive Bayes','KNN' ,'Decision Tree'],
    'Score': [0.75,0.66,0.76,0.66,0.74]})

result_df = results.sort_values(by='Score', ascending=False)
result_df = result_df.set_index('Score')
result_df.head(9)
```

Out[44]:

	Model
Score	
0.76	Naive Bayes
0.75	Logistic Regression
0.74	Decision Tree
0.66	Support Vector Machines
0.66	KNN

In [ ]: