In [1]:
```python
#Importing All Required Libaries
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt

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

In [2]:
```python
#Loading Datasets
pd.set_option('display.max_columns',10,'display.width',1000)
train = pd.read_csv('train.csv')
test = pd.read_csv('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
#Display shape
train.shape
```

Out[3]: (891, 12)

In [4]:
```python
test.shape
```

Out[4]: (418, 11)

In [5]:
```python
#Checking for Null values
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]:
```python
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]:
```python
#Description of dataset
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

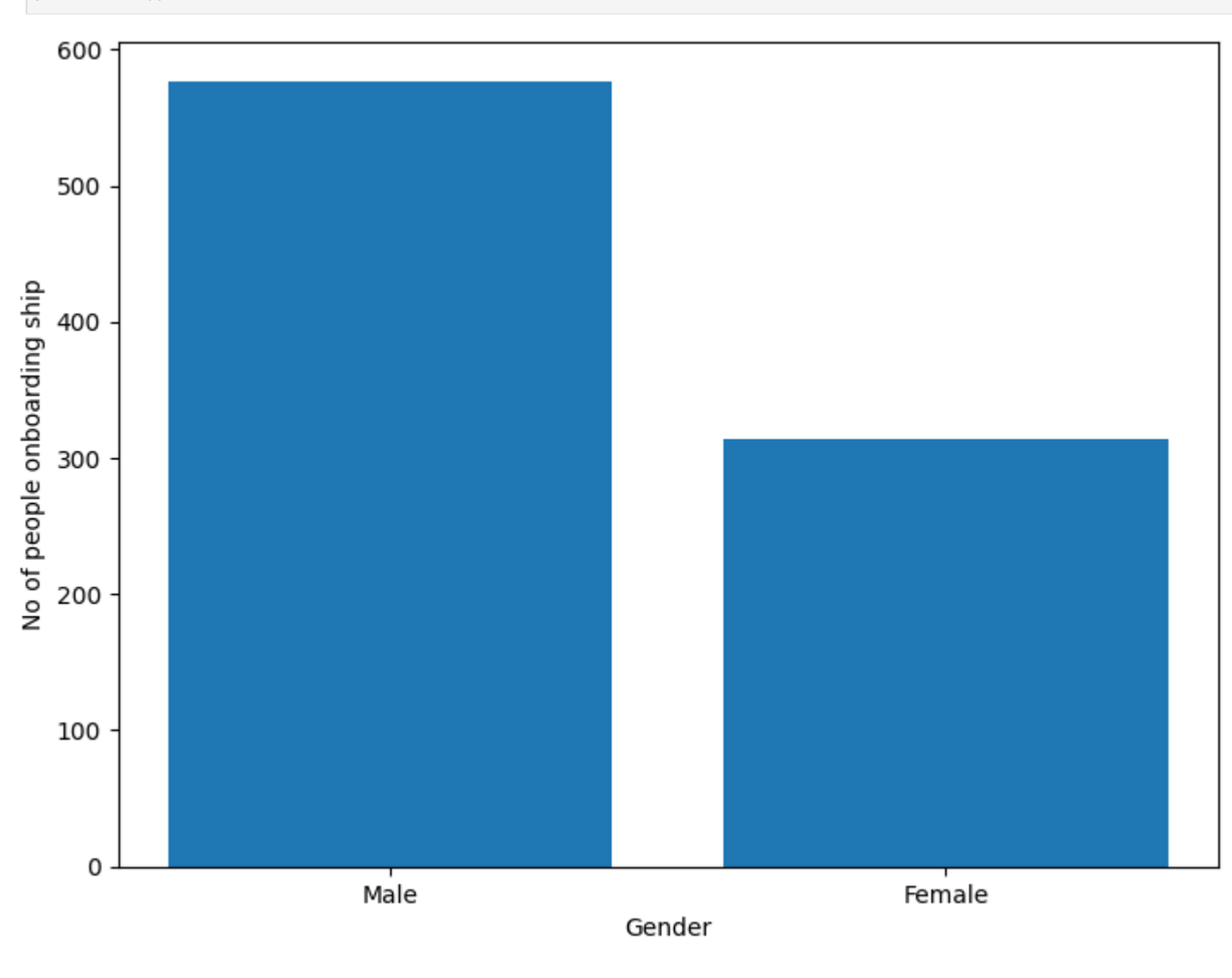
In [10]:
```python
male_ind = len(train[train['Sex'] == 'male'])
print("No of Males in Titanic:",male_ind)
```

No of Males in Titanic: 577

In [11]:
```python
female_ind = len(train[train['Sex'] == 'female'])
print("No of Females in Titanic:",female_ind)
```

No of Females in Titanic: 314

In [12]:
```python
#Plotting
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()
```



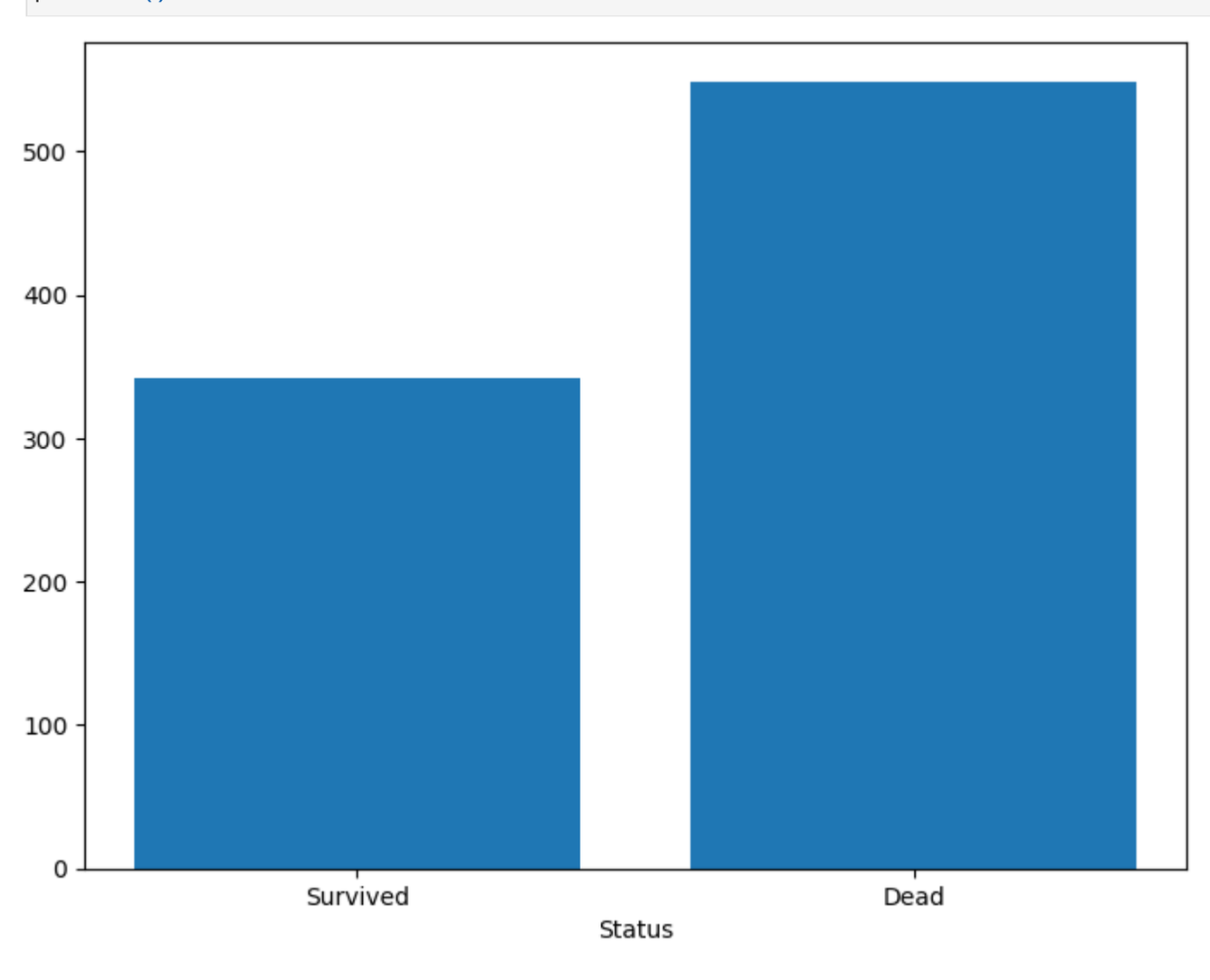
In [13]:
```python
alive = len(train[train['Survived'] == 1])
dead = len(train[train['Survived'] == 0])
```

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

Out[14]:

Sex	Survived
female	0.742038
male	0.188908

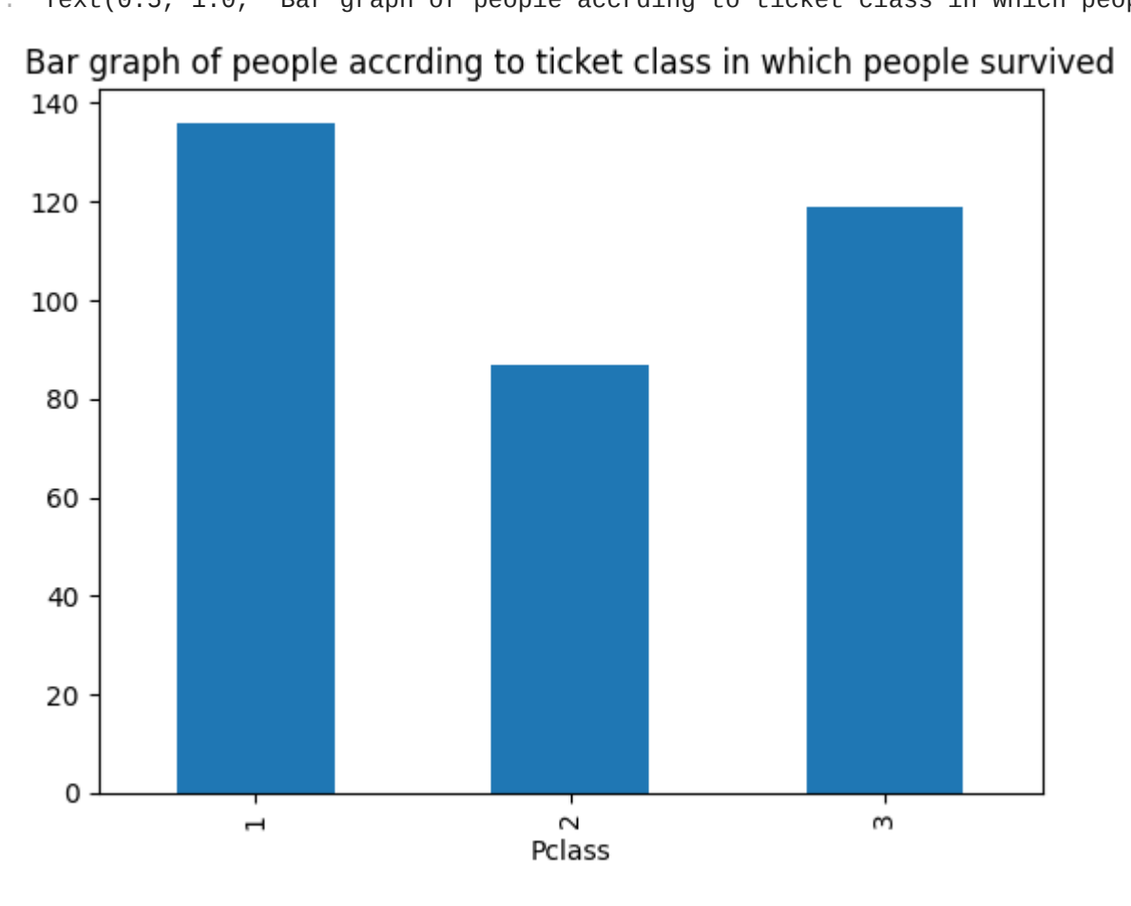
In [16]:
```python
fig = plt.figure()
ax = fig.add_axes([0,0,1,1])
status = ['Survived','Dead']
ind = [alive,dead]
ax.bar(status,ind)
plt.xlabel("Status")
plt.show()
```

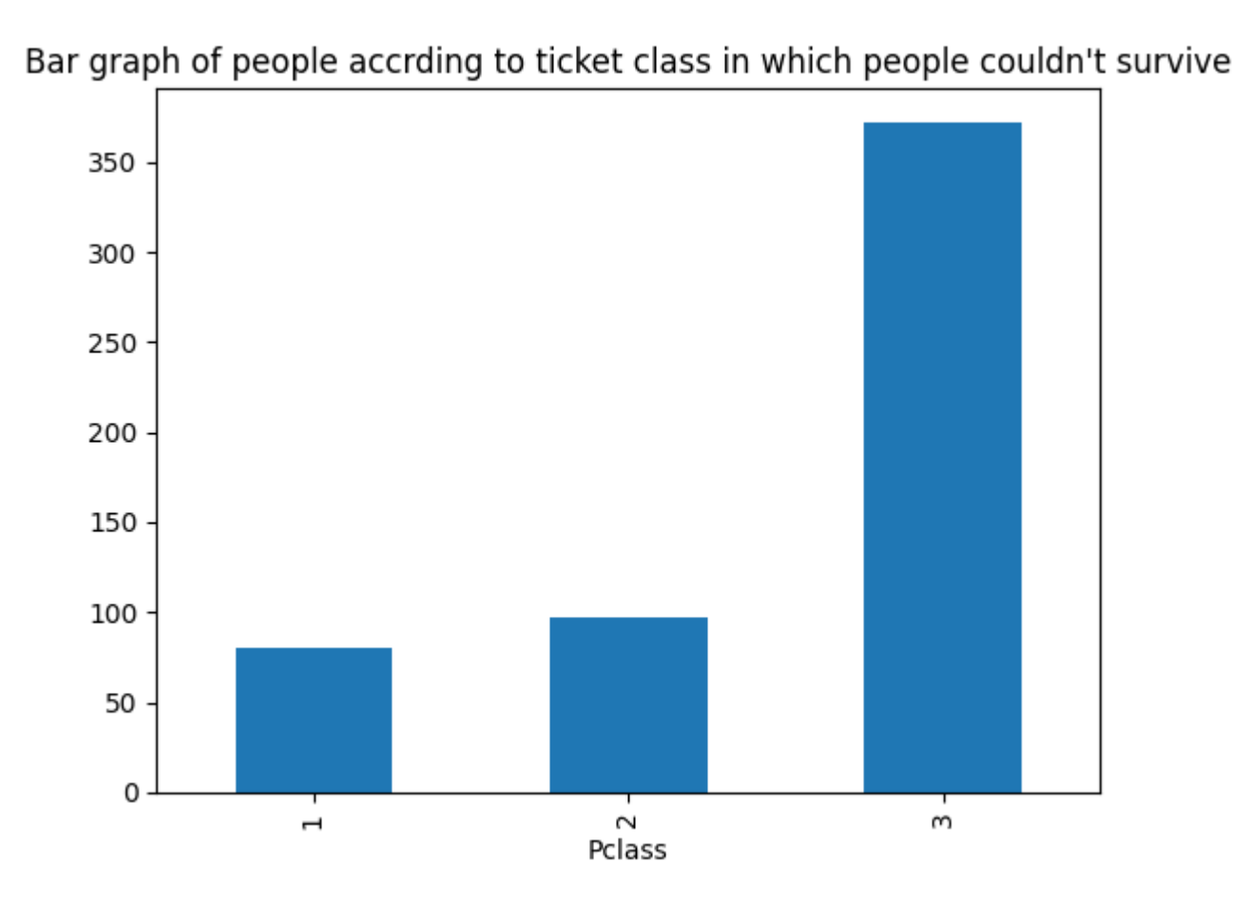


In [17]:
```python
plt.figure(1)
train.loc[train['Survived'] == 1, 'Pclass'].value_counts().sort_index().plot.bar()
plt.title('Bar graph of people accrding to ticket class in which people survived')


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

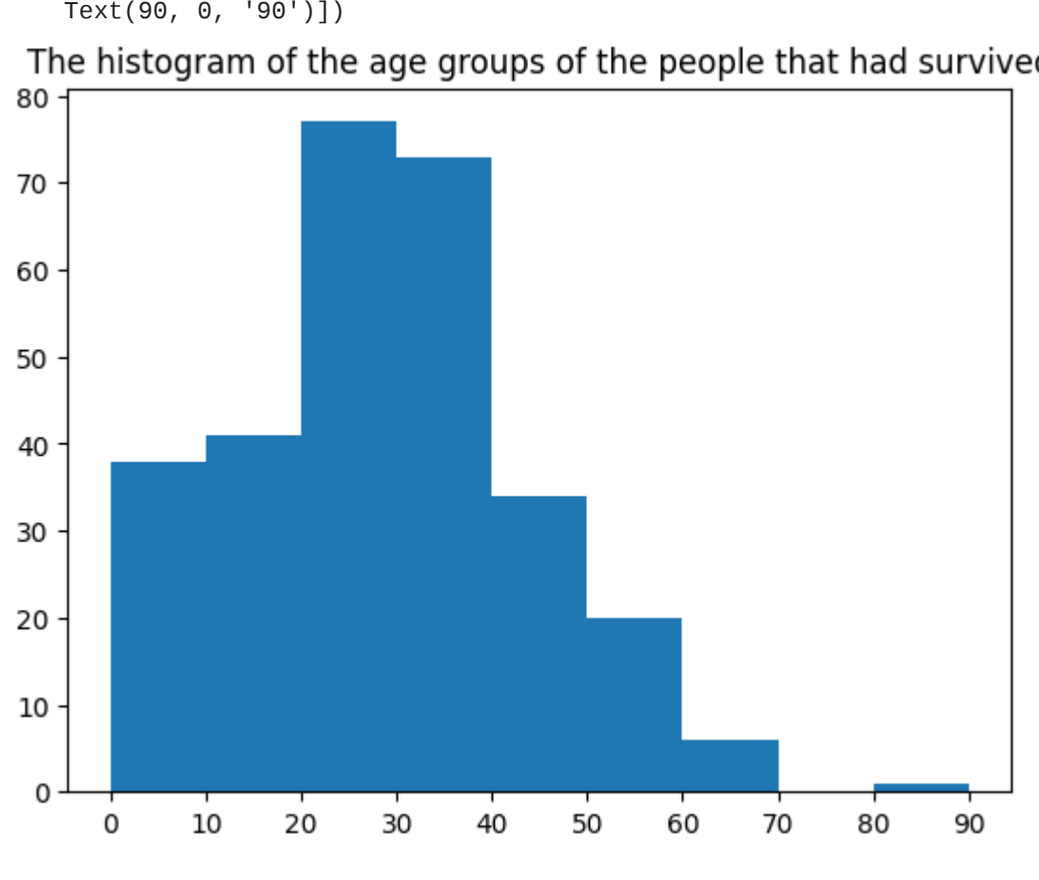


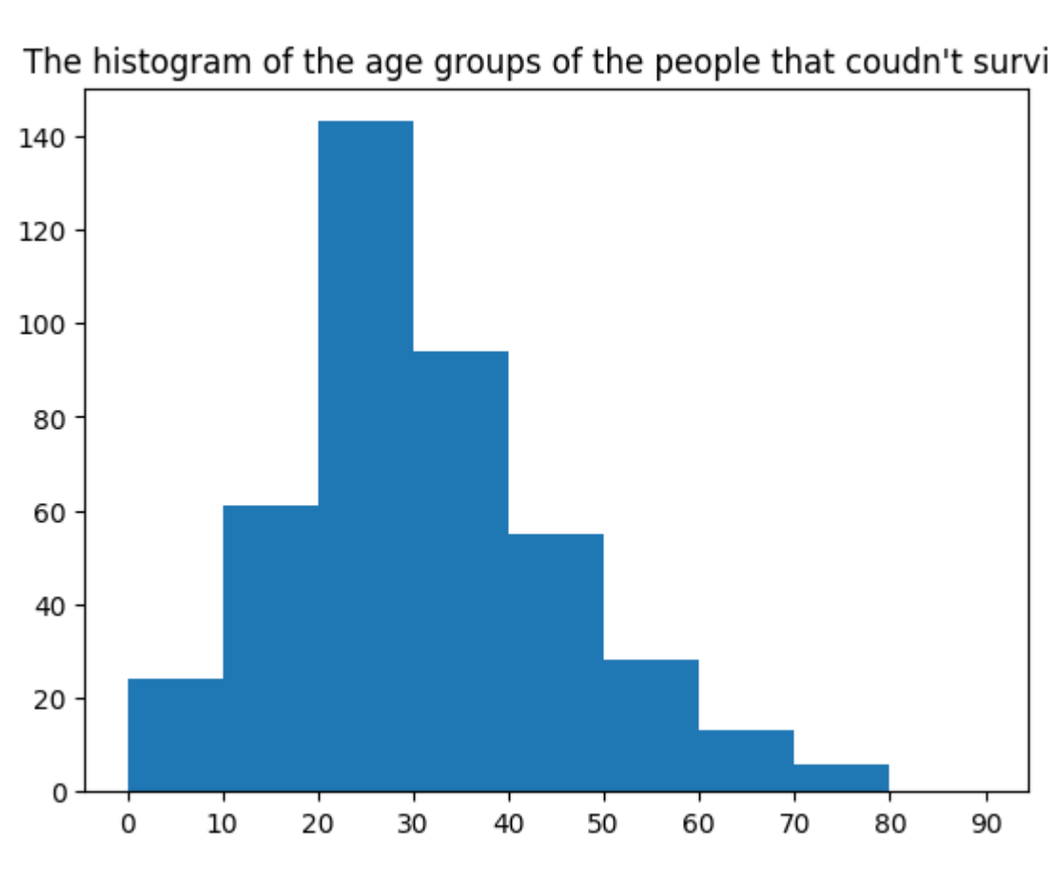


In [18]:
```python
plt.figure(1)
age  = train.loc[train.Survived == 1, 'Age']
plt.title('The histogram of the age groups of the people that had survived')
plt.hist(age, np.arange(0,100,10))
plt.xticks(np.arange(0,100,10))


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[18]:
```
([<matplotlib.axis.XTick at 0x231fa86af90>,
  <matplotlib.axis.XTick at 0x231fa869110>,
  <matplotlib.axis.XTick at 0x231f73c5610>,
  <matplotlib.axis.XTick at 0x231fa8acb50>,
  <matplotlib.axis.XTick at 0x231fa8aed50>,
  <matplotlib.axis.XTick at 0x231fa8b0e90>,
  <matplotlib.axis.XTick at 0x231fa8b3090>,
  <matplotlib.axis.XTick at 0x231fa8b3c90>,
  <matplotlib.axis.XTick at 0x231fa8b5f50>,
  <matplotlib.axis.XTick at 0x231fa8b7fd0>],
 [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')])
```





In [19]:
```python
train[["SibSp", "Survived"]].groupby(['SibSp'], as_index=False).mean().sort_values(by='Survived', ascending=False)
```

Out[19]:

	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 [20]:
```python
train[["Pclass", "Survived"]].groupby(['Pclass'], as_index=False).mean().sort_values(by='Survived', ascending=False)
```

Out[20]:

	Pclass	Survived
0	1	0.629630
1	2	0.472826
2	3	0.242363

In [21]:
```python
train[["Age", "Survived"]].groupby(['Age'], as_index=False).mean().sort_values(by='Age', ascending=True)
```

Out[21]:

	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

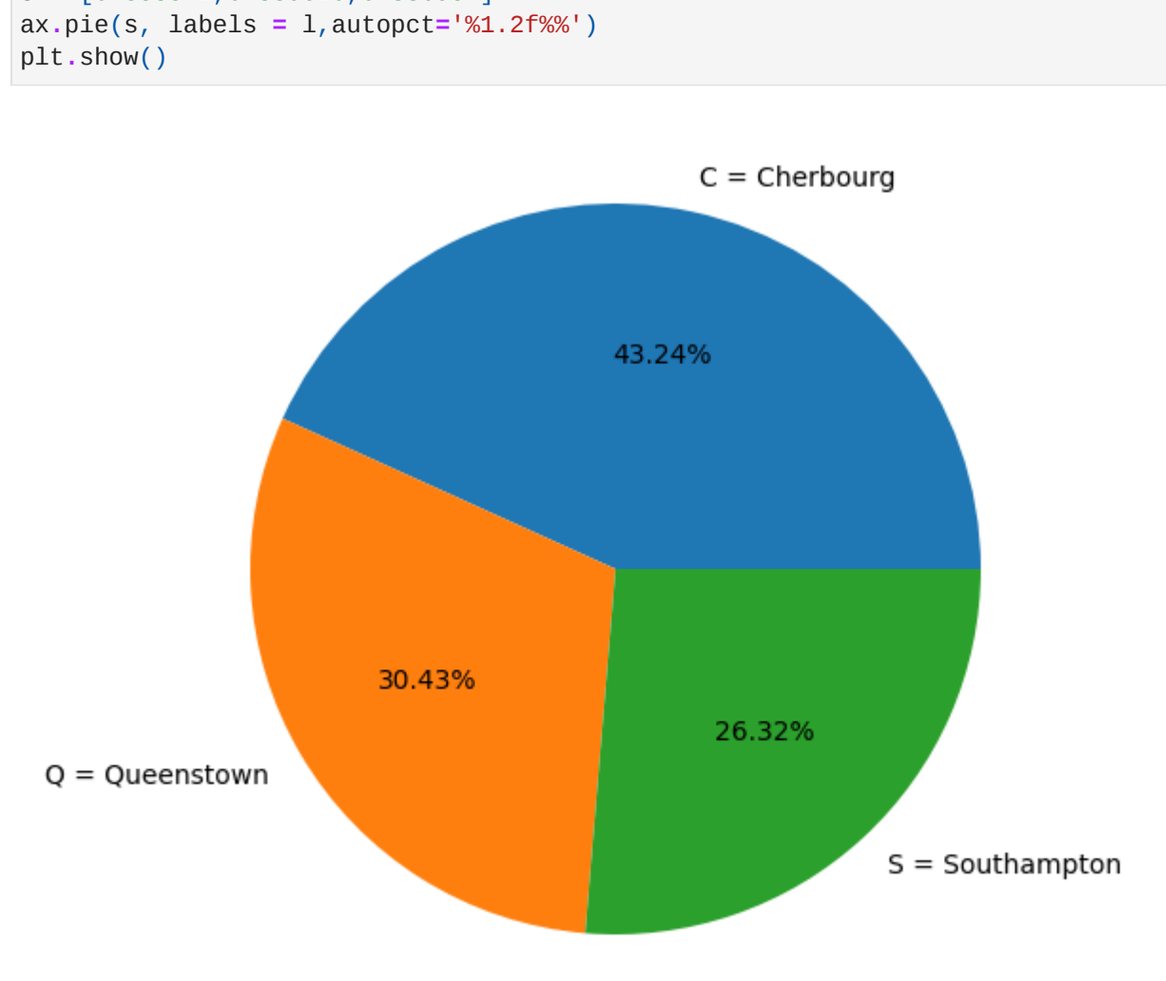
88 rows × 2 columns

In [23]:
```python
train[["Embarked", "Survived"]].groupby(['Embarked'], as_index=False).mean().sort_values(by='Survived', ascending=False)
```

Out[23]:

	Embarked	Survived
0	C	0.553571
1	Q	0.389610
2	S	0.336957

In [24]:
```python
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 [25]:
```python
test.describe(include="all")
```

Out[25]:

	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 [26]:
```python
#Droping Useless Columns
train = train.drop(['Ticket'], axis = 1)
test = test.drop(['Ticket'], axis = 1)
```

In [27]:
```python
train = train.drop(['Cabin'], axis = 1)
test = test.drop(['Cabin'], axis = 1)
```

In [28]:
```python
train = train.drop(['Name'], axis = 1)
test = test.drop(['Name'], axis = 1)
```

In [29]:
```python
#Feature Selection
column_train=['Age','Pclass','SibSp','Parch','Fare','Sex','Embarked']
#training values
X=train[column_train]
#target value
Y=train['Survived']
```

In [30]:
```python
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[30]: 2

In [31]:
```python
X['Age']=X['Age'].fillna(X['Age'].median())
X['Age'].isnull().sum()
```

Out[31]: 0

In [32]:
```python
X['Embarked'] = train['Embarked'].fillna(method ='pad')
X['Embarked'].isnull().sum()
```

Out[32]: 0

In [33]:
```python
d={'male':0, 'female':1}
X['Sex']=X['Sex'].apply(lambda x:d[x])
X['Sex'].head()
```

Out[33]:
```
0    0
1    1
2    1
3    1
4    0
Name: Sex, dtype: int64
```

In [34]:
```python
e={'C':0, 'Q':1 ,'S':2}
X['Embarked']=X['Embarked'].apply(lambda x:e[x])
X['Embarked'].head()
```

Out[34]:
```
0    2
1    0
2    2
3    2
4    2
Name: Embarked, dtype: int64
```

In [35]:
```python
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 [36]:
```python
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: 0.7574626865671642

In [37]:
```python
from sklearn.metrics import accuracy_score,confusion_matrix
confusion_mat = confusion_matrix(Y_test,Y_pred)
print(confusion_mat)
```

```
[[130  26]
 [ 39  73]]
```

In [38]:
```python
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 [39]:
```python
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 [40]:
```python
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 [41]:
```python
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 [42]:
```python
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 [43]:
```python
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 [44]:
```python
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 [45]:
```python
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 [46]:
```python
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[46]:

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