Kaggle Titanic project - Classification problem

Prediction of who will survive

Libraries being used

In [1]:
```
import numpy as np
import matplotlib.pyplot as plt
import pandas as pd
import seaborn as sb
%matplotlib inline
from matplotlib import rcParams
```

datasets provided

In [266]:
```
# linux machine path
# test =pd.read_csv('/home/mehroz/Desktop/ml/code1/input/test.csv', encoding='utf8
', engine='python')
# train = pd.read_csv('/home/mehroz/Desktop/ml/code1/input/train.csv', encoding='u
tf8', engine='python')

#windows path
test =pd.read_csv('C:/Users/sheik/Desktop/ML/kaggle/Machine-learning--kaggle-titan
ic-progect-assignment-/input/test.csv', encoding='utf8', engine='python')
train = pd.read_csv('C:/Users/sheik/Desktop/ML/kaggle/Machine-learning--kaggle-tit
anic-progect-assignment-/input/train.csv', encoding='utf8', engine='python')
```

properties of data

In [3]:
```
data = train.append(test,sort=False)
print ("data rows: %d \ndata attributes: %d" % (data.shape[0],data.shape[1]))
```

```
data rows: 1309
data attributes: 12
```

properties of training data

attributes of training data

In [4]:
```
train.columns
```

Out[4]:
```
Index([u'PassengerId', u'Survived', u'Pclass', u'Name', u'Sex', u'Age',
       u'SibSp', u'Parch', u'Ticket', u'Fare', u'Cabin', u'Embarked'],
      dtype='object')
```

no of columns of training data

In [5]:
```
cols = train.columns.size
cols
```

Out[5]: 12

no of rows

In [6]:
```
rows = train['PassengerId'].size
rows
```

Out[6]: 891

Alternatively

In [7]:
```
train.shape
```

Out[7]: (891, 12)

train data is 66%

Attribute types

In [8]:
```
train.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 891 entries, 0 to 890
Data columns (total 12 columns):
PassengerId    891 non-null int64
Survived       891 non-null int64
Pclass         891 non-null int64
Name           891 non-null object
Sex            891 non-null object
Age            714 non-null float64
SibSp          891 non-null int64
Parch          891 non-null int64
Ticket         891 non-null object
Fare           891 non-null float64
Cabin          204 non-null object
Embarked       889 non-null object
dtypes: float64(2), int64(5), object(5)
memory usage: 66.2+ KB
```

people who survived attribute wise comparison and graphs

In [9]:
```
survivors = train.Survived.sum()
survivors
```

Out[9]: 342

Deaths

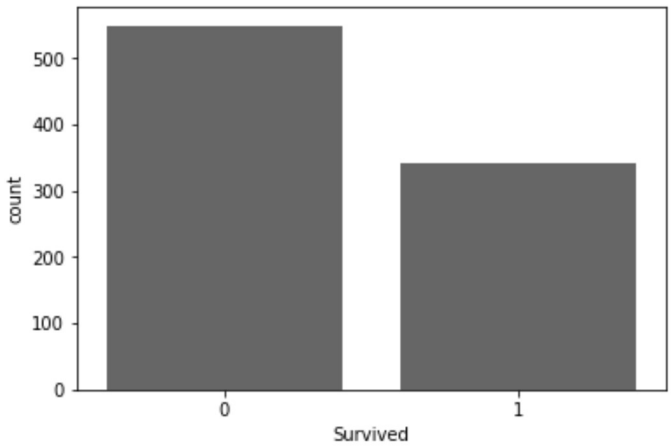
In [10]:
```
rows - survivors
```

Out[10]: 549

Comparison

In [11]:
```
sb.countplot(x='Survived',data= train, color='#666666')
```

Out[11]: <matplotlib.axes._subplots.AxesSubplot at 0x108b6d70>



example row value

In [12]:
```
train.head(1)
```

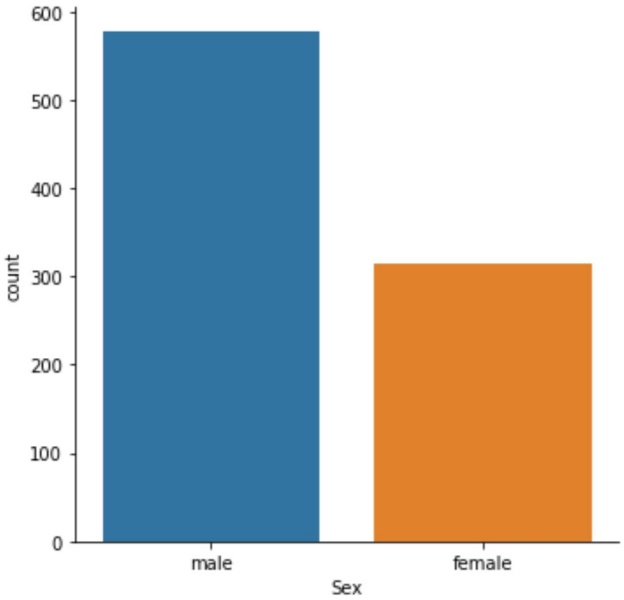
Out[12]:

	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	7.25	NaN	S

Gender ratio

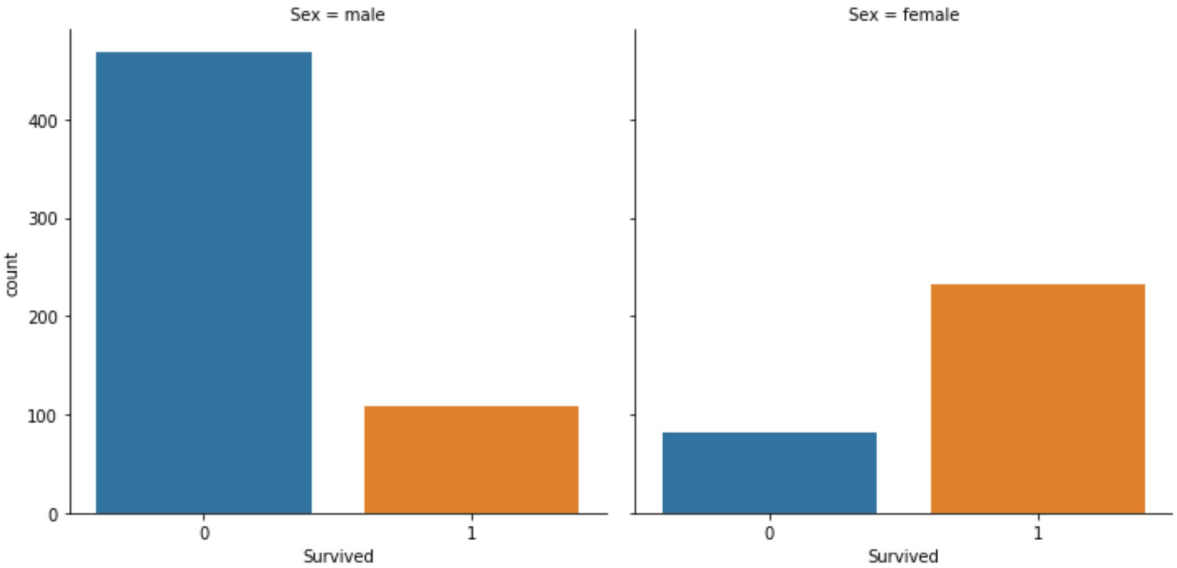
In [13]:
```
sb.factorplot(x='Sex', kind='count', data=train);
```

```
c:\python27\lib\site-packages\seaborn\categorical.py:3666: UserWarning: The `fac
torplot` function has been renamed to `catplot`. The original name will be remov
ed in a future release. Please update your code. Note that the default `kind` in
`factorplot` (`'point'`) has changed `'strip'` in `catplot`.
  warnings.warn(msg)
```



Male vs Female survival rate

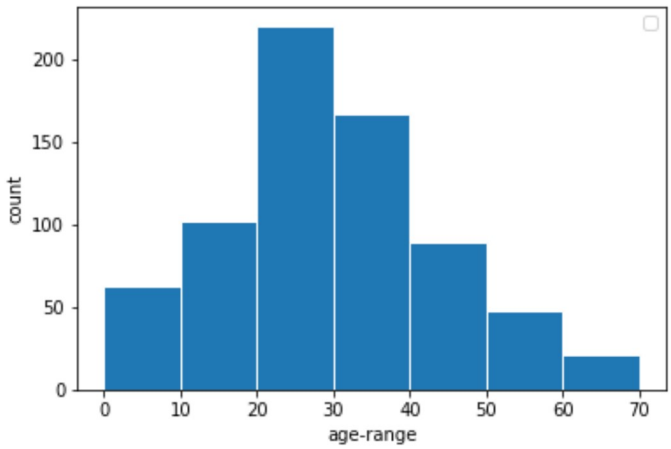
In [14]:
```
sb.factorplot(x='Survived', col='Sex', kind='count', data=train);
```



Passangers in age

In [15]:
```
#ageRange = pd.cut(train['Age'],bins=[10,20,30,40,50,60,70,80])
ageBins=[x*10 for x in range(0,int(train.Age.max()/10))]
plt.hist(train.Age, ageBins, edgecolor="#ffffff")
plt.legend()
plt.xlabel("age-range")
plt.ylabel("count")
```

Out[15]:
```
Text(0,0.5,'count')
```



In [16]:
```
train['ageGroups']=pd.cut(train.Age,ageBins)
ageGroupsAndCounts = train.astype(str).groupby(['ageGroups']).PassengerId.agg(['cou
nt'])
ageGroupsAndCounts.T
```

Out[16]:

ageGroups	(0.0, 10.0]	(10.0, 20.0]	(20.0, 30.0]	(30.0, 40.0]	(40.0, 50.0]	(50.0, 60.0]	(60.0, 70.0]	nan
count	64	115	230	155	86	42	17	182

Gender saperated age groups

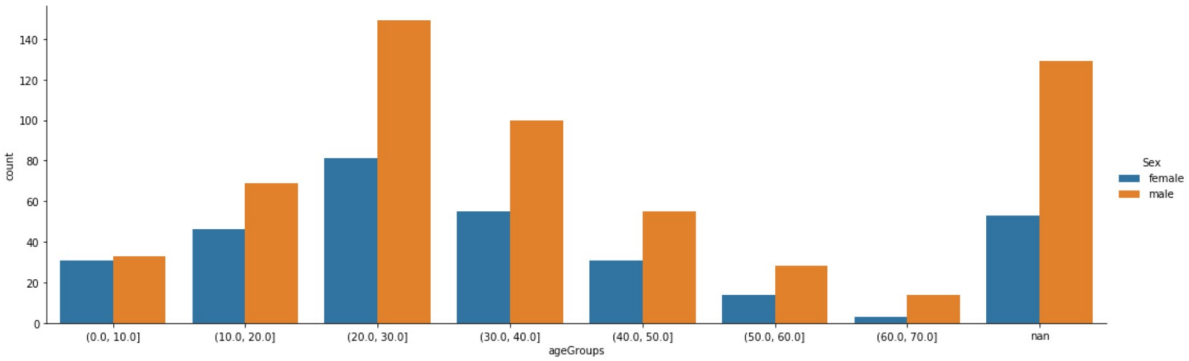
In [17]:
```
ageAndSexCounts=train.astype(str).groupby(['ageGroups','Sex']).PassengerId.agg(['co
unt'])
# for i in range(0,16):
#     a = ageAndSexCounts.ageGroups.iloc[i].split(',')
#     ageAndSexCounts.ageGroups.iloc[i] =( (a[0][1:] + " to " + a[1][1:5]) if (i<1
4) else 'null')
ageAndSexCounts.T
```

Out[17]:

ageGroups	(0.0, 10.0]		(10.0, 20.0]		(20.0, 30.0]		(30.0, 40.0]		(40.0, 50.0]		(50.0, 60.0]		(60.0, 70.0]	
Sex	female	male	female	male	female	male	female	male	female	male	female	male	female	mal
count	31	33	46	69	81	149	55	100	31	55	14	28	3	1

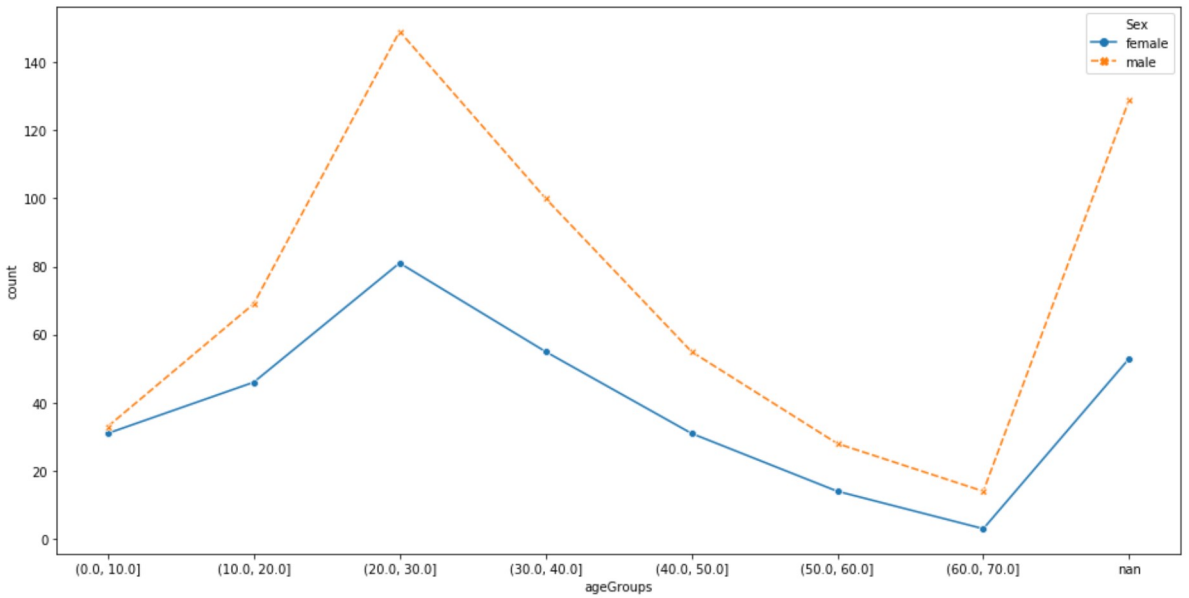
In [18]:
```
sb.factorplot(x='ageGroups', y='count', hue='Sex', data=ageAndSexCounts.reset_index
(), kind='bar',aspect=3)
```

Out[18]:
```
<seaborn.axisgrid.FacetGrid at 0x48fa150>
```



In [19]:
```
# figure size in inches
rcParams['figure.figsize'] = 16.0,8.0
sb.lineplot(x="ageGroups", y="count", hue="Sex", style="Sex", markers=True, data=ag
eAndSexCounts.reset_index())
```

Out[19]:
```
<matplotlib.axes._subplots.AxesSubplot at 0x10fa9970>
```



survival rates

In [20]:
```
train['ageGroups']=pd.cut(train.Age,ageBins)
survivors = train[train['Survived']==1].astype(str).groupby(['ageGroups','Sex']).Su
rvived.agg(['count'])
survivors.T
```

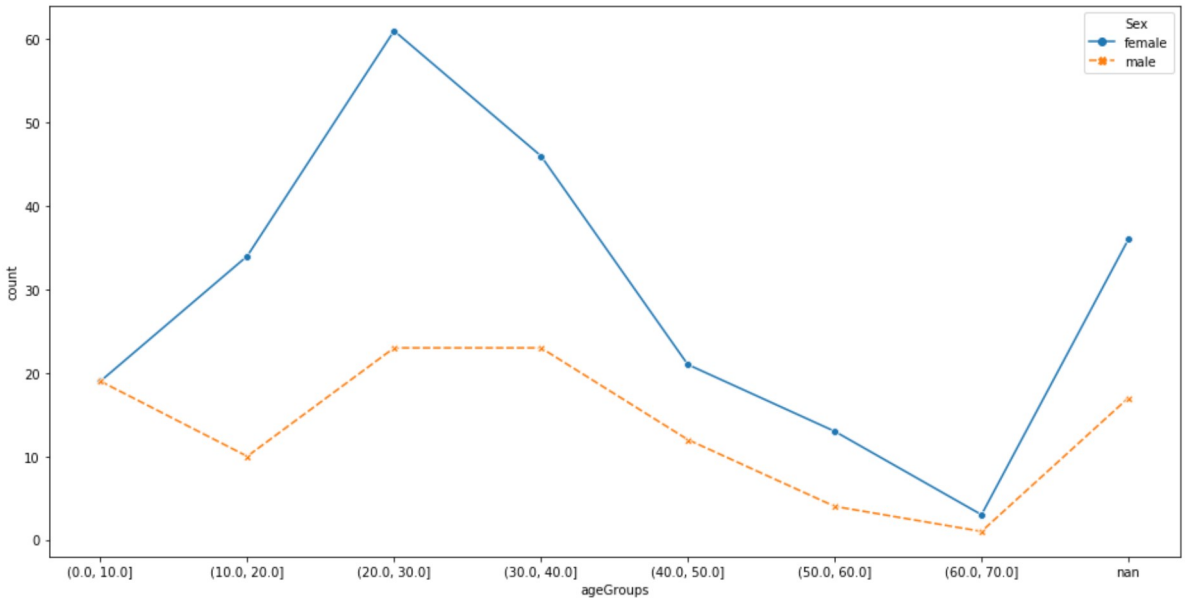
Out[20]:

ageGroups	(0.0, 10.0]		(10.0, 20.0]		(20.0, 30.0]		(30.0, 40.0]		(40.0, 50.0]		(50.0, 60.0]		(60.0, 70.0]	
Sex	**female**	**male**	**female**	**male**	**female**	**male**	**female**	**male**	**female**	**male**	**female**	**male**	**female**	**mal**
count	19	19	34	10	61	23	46	23	21	12	13	4	3	

Below are people who survived

In [21]:
```
rcParams['figure.figsize'] = 16.0,8.0
# sb.lineplot(x="ageGroups", y="count", hue="Sex", style="Sex", markers=True, data=
survivors.reset_index())
sb.lineplot(x="ageGroups", y="count", hue="Sex", style="Sex", markers=True, data=su
rvivors.reset_index())
```

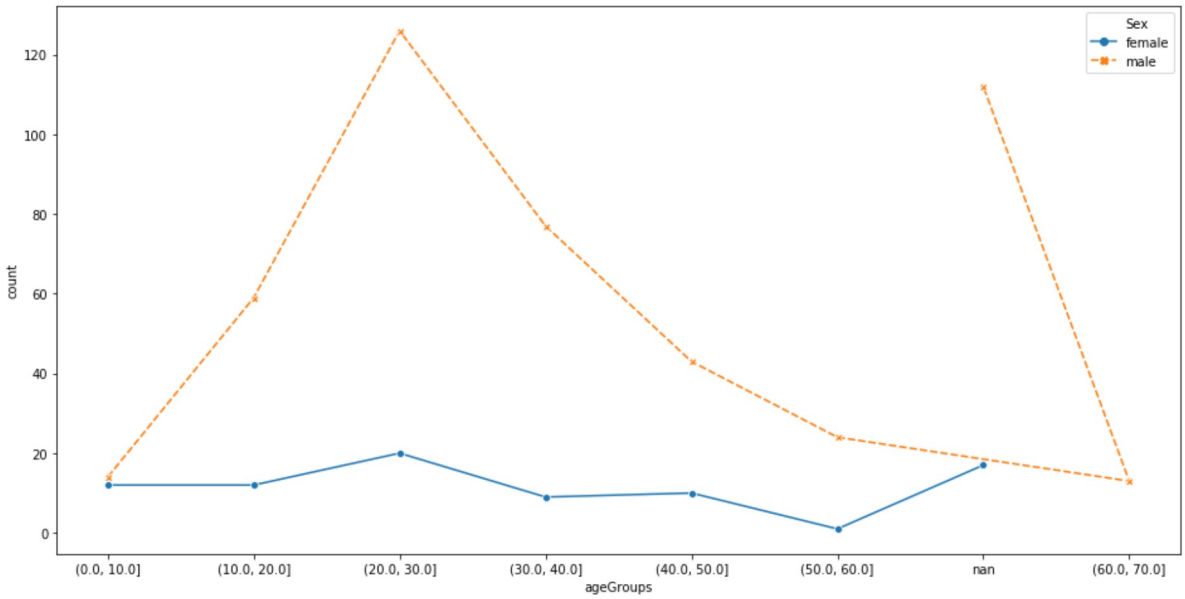
Out[21]: <matplotlib.axes._subplots.AxesSubplot at 0x12cdd290>



Below are people who died

In [22]:
```
survivors = train[train['Survived']==0].astype(str).groupby(['ageGroups','Sex']).Survived.agg(['count'])
sb.lineplot(x="ageGroups", y="count", hue="Sex", style="Sex", markers=True, data=survivors.reset_index())
```

Out[22]: <matplotlib.axes._subplots.AxesSubplot at 0x12cf7210>

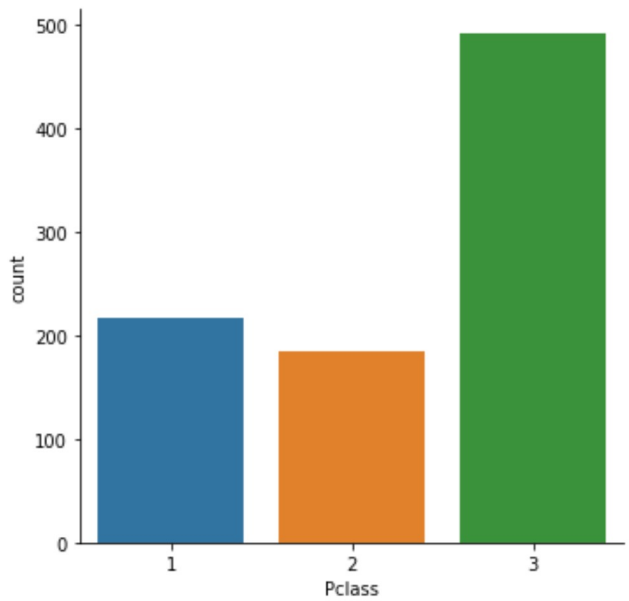


In [23]:
```
train.astype(str).groupby('Pclass').PassengerId.agg(['count']).T
```

Out[23]:

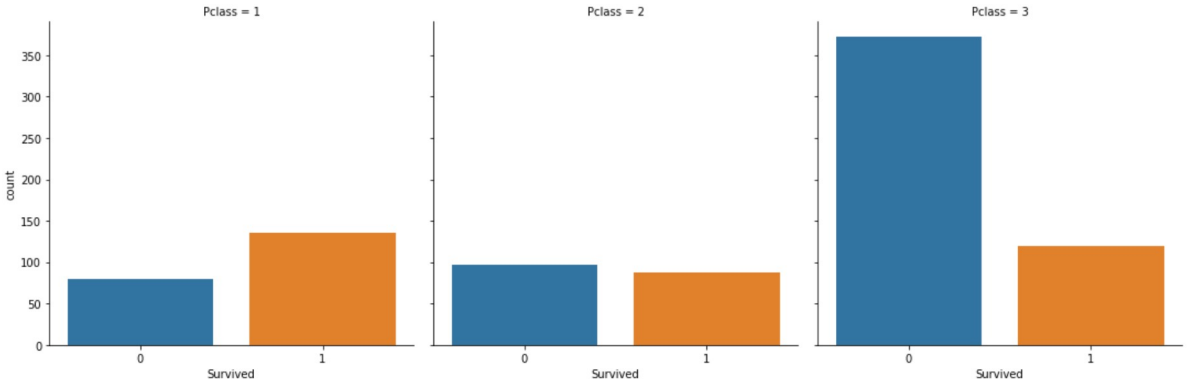
Pclass	1	2	3
count	216	184	491

In [24]:
```
sb.factorplot(x='Pclass', kind='count', data=train);
```

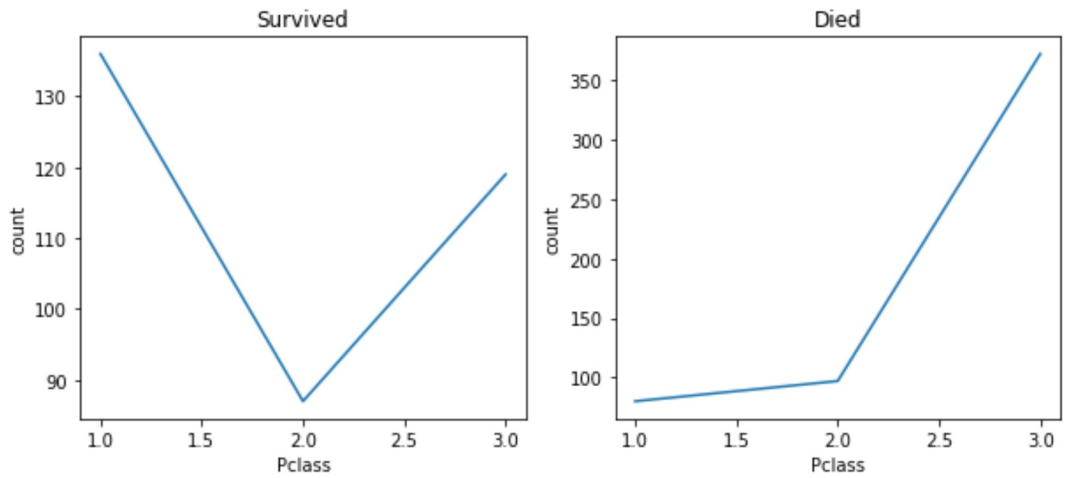


survivors to deaths

In [25]:
```
sb.factorplot(x='Survived', kind='count',col='Pclass', data=train);
```



In [31]:
```
rcParams['figure.figsize'] = 10.0,4.0
fig, ax =plt.subplots(1,2)
sb.lineplot(x="Pclass", y="count", data=train[train.Survived==1].groupby('Pclass').
PassengerId.agg(['count']).reset_index(), ax=ax[0]).set_title('Survived')
sb.lineplot(x="Pclass", y="count", data=train[train.Survived==0].groupby('Pclass').
PassengerId.agg(['count']).reset_index(), ax=ax[1]).set_title('Died')
fig.show()
```



SibSP relation

survival rates

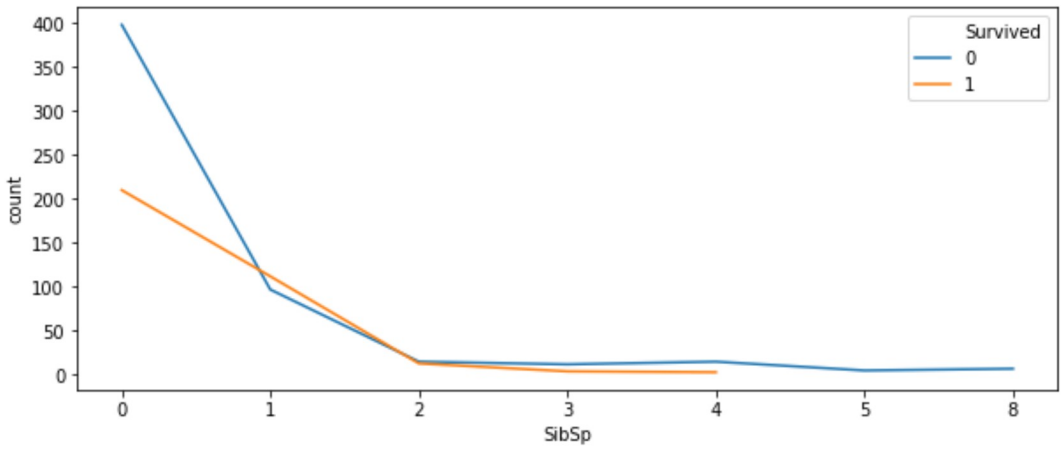
In [106]:
```
d = train.astype(str).groupby(['SibSp','Survived']).PassengerId.agg(['count'])
d.T
```

Out[106]:

SibSp	0		1		2		3		4		5	8
Survived	0	1	0	1	0	1	0	1	0	1	0	0
count	398	210	97	112	15	13	12	4	15	3	5	7

In [107]:
```
sb.lineplot(x="SibSp", y="count",hue="Survived", markers=True, data=d.reset_index
())
```

Out[107]: <matplotlib.axes._subplots.AxesSubplot at 0x15107b10>



gender vise

In [73]:
```
d = train.astype(str).groupby(['SibSp','Survived','Sex']).PassengerId.agg(['count
'])
d.T
```

Out[73]:

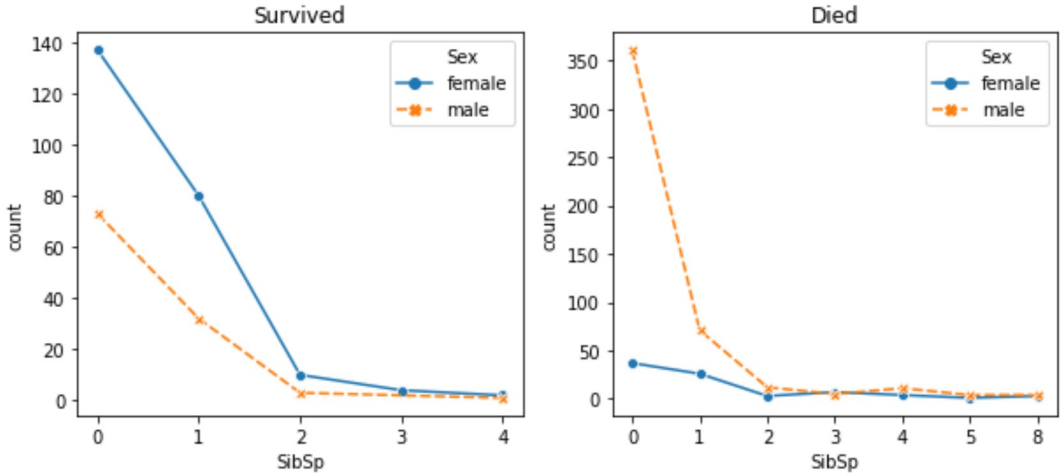
SibSp	0				1				2		...	3		4	
Survived	0		1		0		1		0		...	0	1	0	
Sex	female	male	female	male	female	male	female	male	female	male	...	male	female	female	m
count	37	361	137	73	26	71	80	32	3	12	...	5	4	4	

1 rows × 23 columns

In [83]:
```
# sb.lineplot(x="SibSp", y="count",hue="Sex", style="Sex", markers=True, data=d.res
et_index()).set_title('Died')
d=d.reset_index()
```

In [100]:
```
fig, ax = plt.subplots(1,2)
sb.lineplot(x="SibSp", y="count",hue="Sex", style="Sex", markers=True, data=d[d.Su
rvived.astype('int64')==1],ax=ax[0]).set_title('Survived')
sb.lineplot(x="SibSp", y="count",hue="Sex", style="Sex", markers=True, data=d[d.Su
rvived.astype('int64')==0],ax=ax[1]).set_title('Died')
```

Out[100]: Text(0.5,1,'Died')



Parch relation on survival

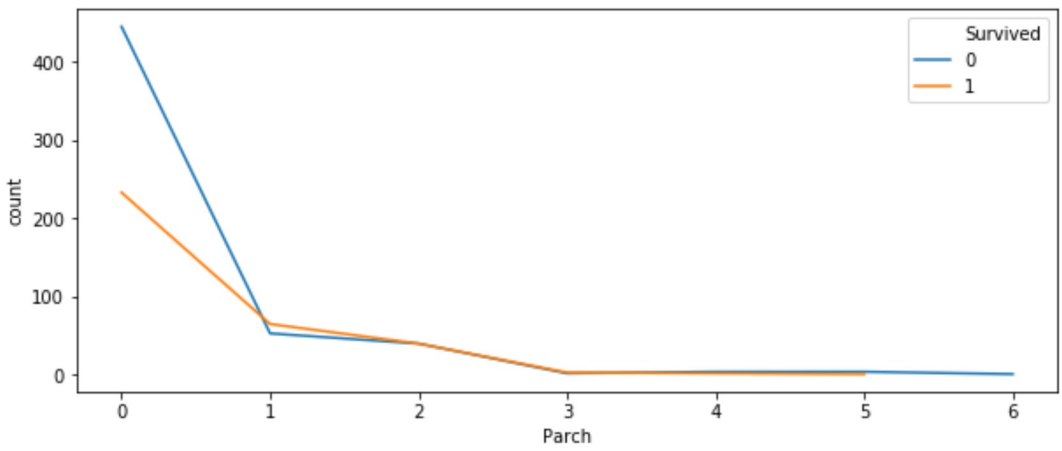
In [108]:
```
d = train.astype(str).groupby(['Parch','Survived']).PassengerId.agg(['count'])
d.T
```

Out[108]:

Parch	0		1		2		3		4	5		6
Survived	0	1	0	1	0	1	0	1	0	0	1	0
count	445	233	53	65	40	40	2	3	4	4	1	1

In [110]:
```
sb.lineplot(x="Parch", y="count",hue="Survived", markers=True, data=d.reset_index
())
```

Out[110]: <matplotlib.axes._subplots.AxesSubplot at 0x14ea35b0>



Parch survival rates gender vise

In [102]:
```
d = train.astype(str).groupby(['Parch','Survived','Sex']).PassengerId.agg(['count'])
d.T
```

Out[102]:

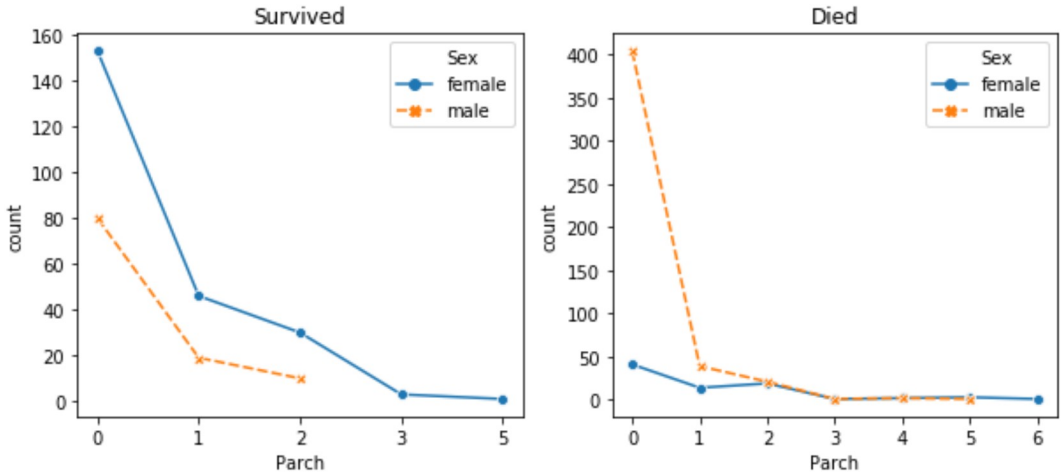
Parch	0				1				2		...	3			
Survived	0		1		0		1		0		...	1	0		1
Sex	female	male	female	male	female	male	female	male	female	male	...	male	female	male	fem
count	41	404	153	80	14	39	46	19	19	21	...	10	1	1	

1 rows × 21 columns

In [103]:
```
d=d.reset_index()
```

In [105]:
```
fig, ax = plt.subplots(1,2)
sb.lineplot(x="Parch", y="count",hue="Sex", style="Sex", markers=True, data=d[d.Survived.astype('int64')==1],ax=ax[0]).set_title('Survived')
sb.lineplot(x="Parch", y="count",hue="Sex", style="Sex", markers=True, data=d[d.Survived.astype('int64')==0],ax=ax[1]).set_title('Died')
```

Out[105]: Text(0.5,1,'Died')

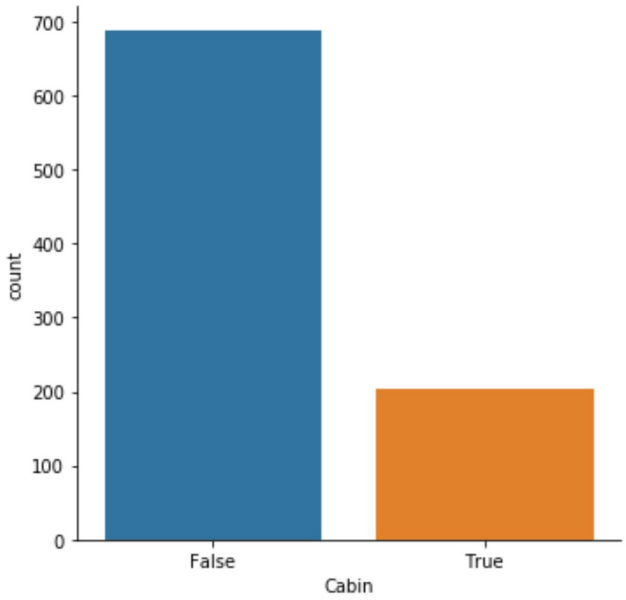


Cabin Survival rates

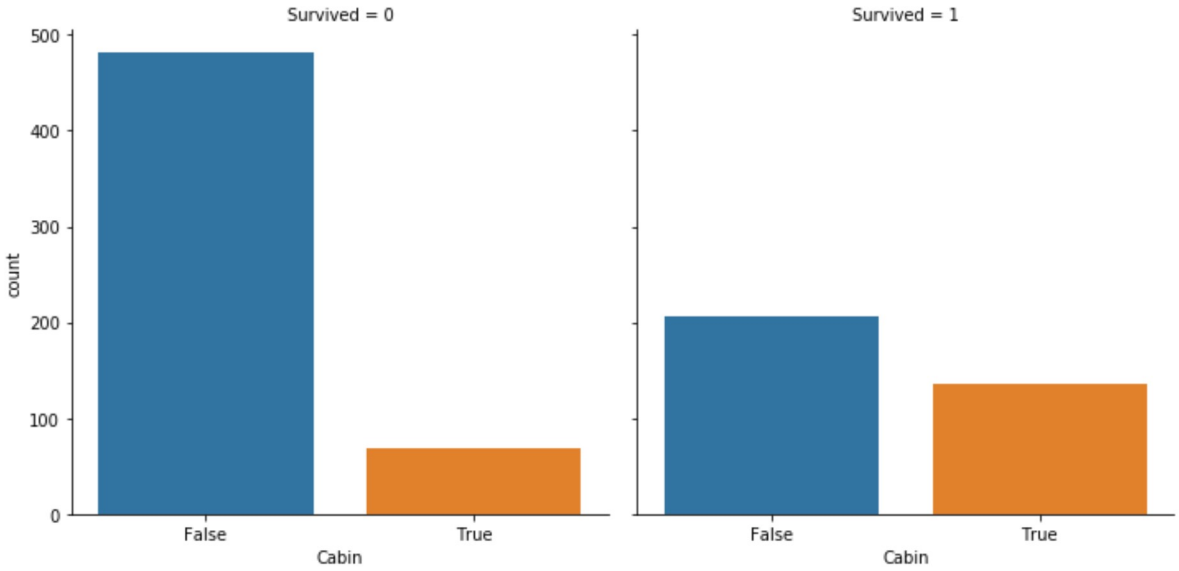
In [176]:
```
d= train.copy()
d.Cabin=d.Cabin.astype(str)!='nan'
d[d.Cabin==True].PassengerId.count()
```

Out[176]: 204

In [177]:
```
sb.factorplot(x='Cabin', kind='count', data=d);
```



In [205]:
```
d=train.copy()
d.Cabin=d.Cabin.astype(str)!='nan'
sb.factorplot(x='Cabin',col='Survived', kind='count', data=d);
```



In [206]:
```
d=d.groupby(['Cabin','Survived']).PassengerId.agg(['count'])
```

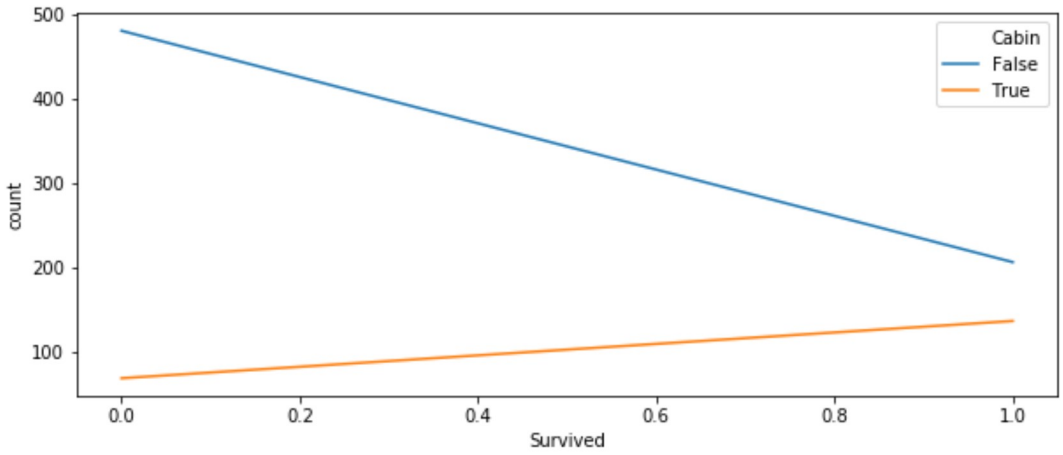
In [207]:
```
d
```

Out[207]:

		count
Cabin	**Survived**	
False	**0**	481
	1	206
True	**0**	68
	1	136

In [208]:
```
sb.lineplot(x="Survived", y="count",hue="Cabin", markers=True, data=d.reset_index
())
```

Out[208]: <matplotlib.axes._subplots.AxesSubplot at 0x157d4f30>



Gender vise

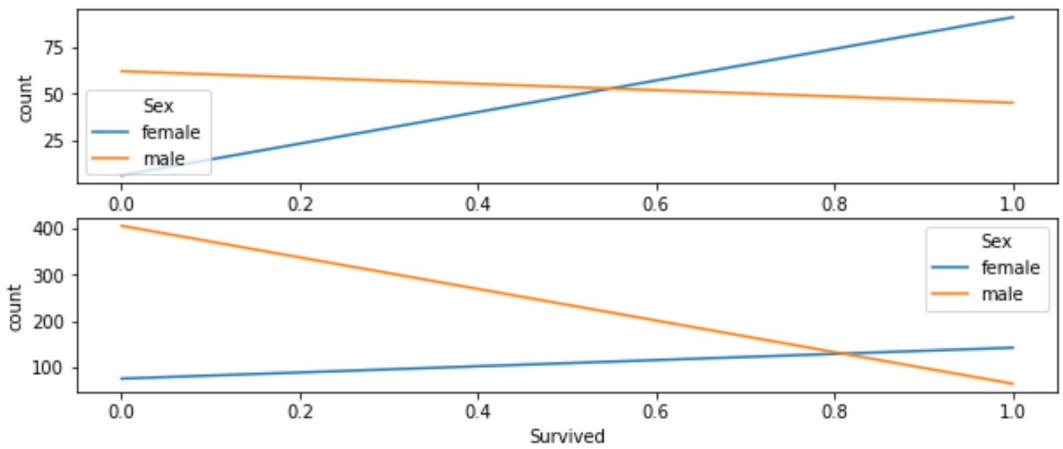
In [209]:
```
d=train.copy()
d.Cabin=d.Cabin.astype(str)!='nan'
d=d.groupby(['Cabin','Survived','Sex']).PassengerId.agg(['count'])
d.T
```

Out[209]:

Cabin	False				True			
Survived	0		1		0		1	
Sex	female	male	female	male	female	male	female	male
count	75	406	142	64	6	62	91	45

In [210]:
```
d=d.reset_index()
fig, ax = plt.subplots(2,1)
sb.lineplot(x="Survived", y="count",hue="Sex", markers=True, data=d[d.Cabin==Tru
e],ax=ax[0])
sb.lineplot(x="Survived", y="count",hue="Sex", markers=True, data=d[d.Cabin==Fals
e],ax=ax[1])
```

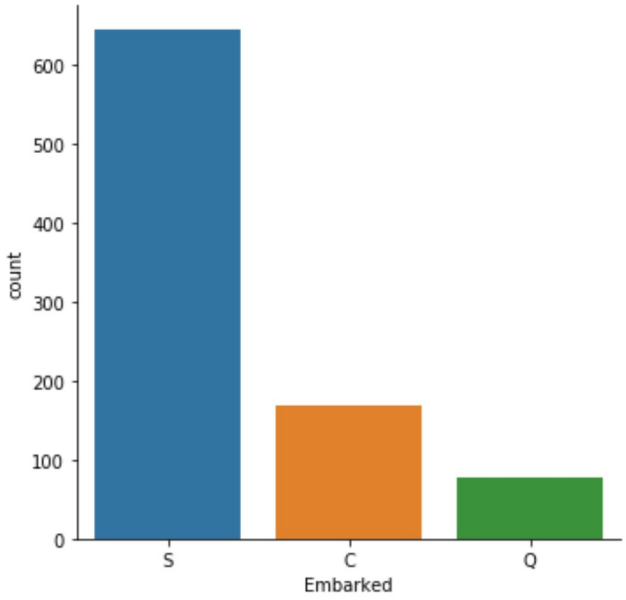
Out[210]: <matplotlib.axes._subplots.AxesSubplot at 0x135f1810>



Embarking port

In [218]:
```
d=train.copy()
sb.factorplot(x='Embarked',kind='count',data=d)
```

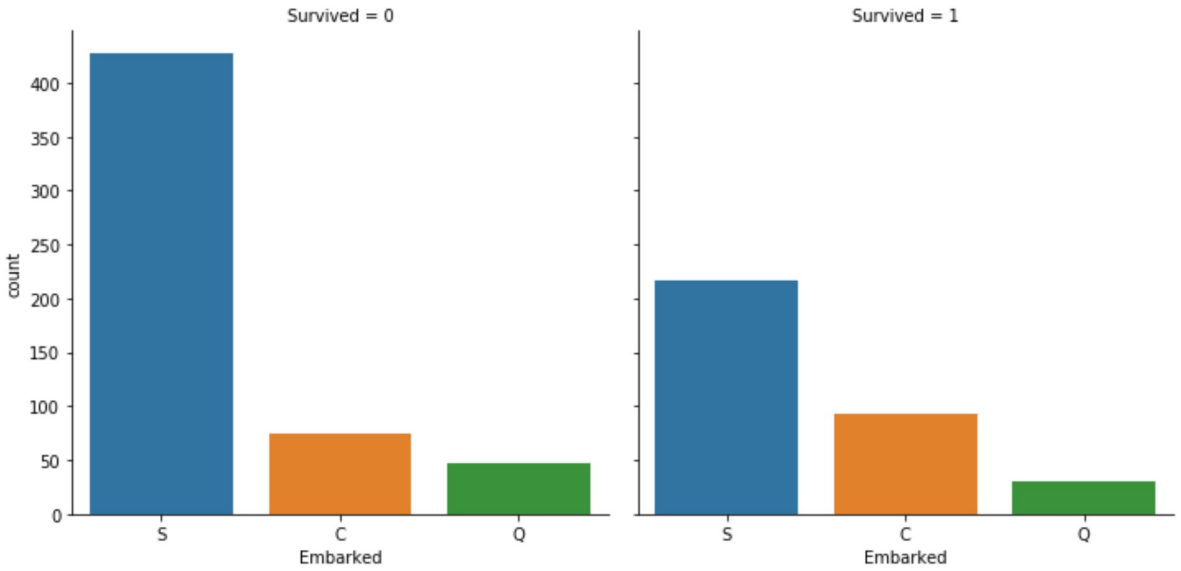
Out[218]: <seaborn.axisgrid.FacetGrid at 0x15d60fd0>



their survival rates

In [219]:
```
sb.factorplot(x='Embarked',col='Survived',kind='count',data=d)
```

Out[219]: <seaborn.axisgrid.FacetGrid at 0x14db76b0>



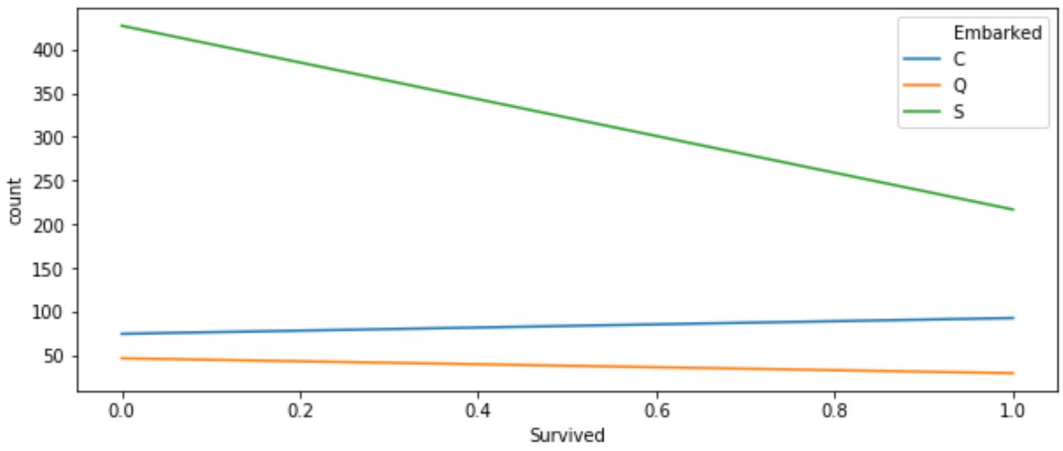
In [223]:
```
d=d.groupby(['Survived','Embarked']).PassengerId.agg(['count'])
d.T
```

Out[223]:

Survived	0			1		
Embarked	C	Q	S	C	Q	S
count	75	47	427	93	30	217

In [226]:
```
sb.lineplot(x="Survived",y='count',hue='Embarked', markers=True, data=d.reset_inde
x())
```

Out[226]: <matplotlib.axes._subplots.AxesSubplot at 0x15c7d410>



In [234]:
```
d=train.copy()
d=d.groupby(['Embarked','Survived','Sex']).PassengerId.agg(['count'])
d.T
```

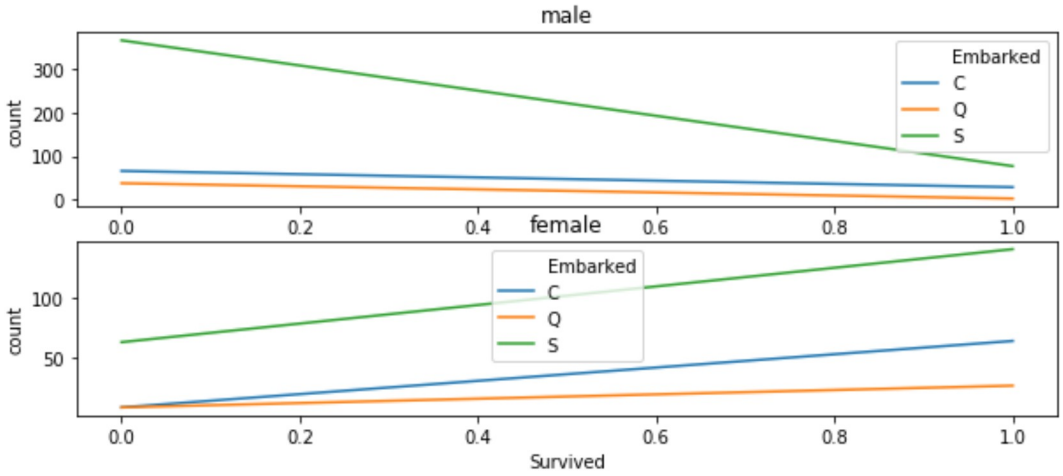
Out[234]:

Embarked	C				Q				S			
Survived	0		1		0		1		0		1	
Sex	female	male	female	male	female	male	female	male	female	male	female	male
count	9	66	64	29	9	38	27	3	63	364	140	77

In [235]:
```
d=d.reset_index()
```

In [240]:
```
fig, ax = plt.subplots(2,1)
sb.lineplot(x="Survived", y="count",hue="Embarked", markers=True, data=d[d.Sex=='male'],ax=ax[0]).set_title("male")
sb.lineplot(x="Survived", y="count",hue="Embarked", markers=True, data=d[d.Sex=='female'],ax=ax[1]).set_title("female")
```

Out[240]:
```
Text(0.5,1,'female')
```



In [304]:
```
from sklearn import svm #support vector Machine
from sklearn.preprocessing import LabelEncoder
```

In [305]:
```
model=svm.SVC(kernel='rbf',C=1,gamma=0.1)
```

In [309]:
```
train=train.dropna()
train_X=train.copy()
train_Y=train.Survived
train_predictor_columns = ['Pclass', 'Sex', 'Age', 'Fare','SibSp','Parch','Cabin','Embarked']
train_X = train_X[train_predictor_columns]
```

In [314]:
```
le = LabelEncoder()
le.fit(train_X['Sex'].astype(str))
train_X['Sex'] = le.transform(train_X['Sex'].astype(str))
le.fit(train_X['Pclass'].astype(str))
train_X['Pclass'] = le.transform(train_X['Pclass'].astype(str))
le.fit(train_X['Embarked'].astype(str))
train_X['Embarked'] = le.transform(train_X['Embarked'].astype(str))
le.fit(train_X['Cabin'].astype(str))
train_X['Cabin'] = le.transform(train_X['Cabin'].astype(str))
```

In [315]:
```
model=svm.SVC(kernel='rbf',C=1,gamma=0.1)
model.fit(train_X,train_Y)
```

Out[315]:
```
SVC(C=1, cache_size=200, class_weight=None, coef0=0.0,
  decision_function_shape='ovr', degree=3, gamma=0.1, kernel='rbf',
  max_iter=-1, probability=False, random_state=None, shrinking=True,
  tol=0.001, verbose=False)
```

In [334]:
```
d=test[train_predictor_columns].dropna()
d.head(1)
```

Out[334]:

	Pclass	Sex	Age	Fare	SibSp	Parch	Cabin	Embarked
0	2	1	34.5	7.8292	0	0	76	1

In [ ]:

In [335]:
```
le.fit(d['Sex'].astype(str))
d['Sex'] = le.transform(d['Sex'].astype(str))
le.fit(d['Pclass'].astype(str))
d['Pclass'] = le.transform(d['Pclass'].astype(str))
le.fit(d['Embarked'].astype(str))
d['Embarked'] = le.transform(d['Embarked'].astype(str))
le.fit(d['Cabin'].astype(str))
d['Cabin'] = le.transform(d['Cabin'].astype(str))
```

In [ ]:

In [336]:
```
model.predict(d)
```

Out[336]:
```
array([1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,
       1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 0, 1, 1, 1, 1, 1, 1,
       1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,
       1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,
       1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,
       1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,
       1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,
       1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,
       1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,
       1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,
       1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,
       1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,
       1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,
       1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,
       1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,
       1], dtype=int64)
```

In [ ]: