In [79]:
```
import numpy as  np
```

In [80]:
```
import pandas as pd
```

In [81]:
```
import seaborn as sns
%matplotlib inline
from matplotlib import pyplot as plt
from matplotlib import style
```

In [82]:
```
with open('titanic.csv') as f: df = pd.read_csv(f, dtype={'age': np.float64, 'sibsp
```

In [39]:
```
df.head(12)
```

Out[39]:

	pclass	survived	name	sex	age	sibsp	parch	ticket	fare	cabin
0	1	1	Allen, Miss. Elisabeth Walton	female	29.0000	0	0	24160	211.3375	B5
1	1	1	Allison, Master. Hudson Trevor	male	0.9167	1	2	113781	151.5500	C22 C26
2	1	0	Allison, Miss. Helen Loraine	female	2.0000	1	2	113781	151.5500	C22 C26
3	1	0	Allison, Mr. Hudson Joshua Creighton	male	30.0000	1	2	113781	151.5500	C22 C26
4	1	0	Allison, Mrs. Hudson J C (Bessie Waldo Daniels)	female	25.0000	1	2	113781	151.5500	C22 C26
5	1	1	Anderson, Mr. Harry	male	48.0000	0	0	19952	26.5500	E12
6	1	1	Andrews, Miss. Kornelia Theodosia	female	63.0000	1	0	13502	77.9583	D7
7	1	0	Andrews, Mr. Thomas Jr	male	39.0000	0	0	112050	0.0000	A36
8	1	1	Appleton, Mrs. Edward Dale (Charlotte Lamson)	female	53.0000	2	0	11769	51.4792	C101
9	1	0	Artagaveytia, Mr. Ramon	male	71.0000	0	0	PC 17609	49.5042	NaN
10	1	0	Astor, Col. John Jacob	male	47.0000	1	0	PC 17757	227.5250	C62 C64
11	1	1	Astor, Mrs. John Jacob (Madeleine Talmadge Force)	female	18.0000	1	0	PC 17757	227.5250	C62 C64

In [83]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 1309 entries, 0 to 1308
Data columns (total 14 columns):
 #   Column     Non-Null Count  Dtype  
---  ------     --------------  -----  
 0   pclass     1309 non-null   int64  
 1   survived   1309 non-null   int64  
 2   name       1309 non-null   object 
 3   sex        1309 non-null   object 
 4   age        1046 non-null   float64
 5   sibsp      1309 non-null   int64  
 6   parch      1309 non-null   int64  
 7   ticket     1309 non-null   object 
 8   fare       1308 non-null   float64
 9   cabin      295 non-null    object 
 10  embarked   1307 non-null   object 
 11  boat       486 non-null    object 
 12  body       121 non-null    float64
 13  home.dest  745 non-null    object 
dtypes: float64(3), int64(4), object(7)
memory usage: 143.3+ KB
```

In [85]:
```
df.describe()
```

Out[85]:

	pclass	survived	age	sibsp	parch	fare	
count	1309.000000	1309.000000	1046.000000	1309.000000	1309.000000	1308.000000	121.0
mean	2.294882	0.381971	29.881135	0.498854	0.385027	33.295479	160.8
std	0.837836	0.486055	14.413500	1.041658	0.865560	51.758668	97.6
min	1.000000	0.000000	0.166700	0.000000	0.000000	0.000000	1.0
25%	2.000000	0.000000	21.000000	0.000000	0.000000	7.895800	72.0
50%	3.000000	0.000000	28.000000	0.000000	0.000000	14.454200	155.0
75%	3.000000	1.000000	39.000000	1.000000	0.000000	31.275000	256.0
max	3.000000	1.000000	80.000000	8.000000	9.000000	512.329200	328.0

In [11]:
```
total = df.isnull().sum().sort_values(ascending=False)
percent_1 = df.isnull().sum()/df.isnull().count()*100
percent_2 = (round(percent_1, 1)).sort_values(ascending=False)
missing_data = pd.concat([total, percent_2], axis=1, keys=['Total', '%'])
missing_data.head()
```

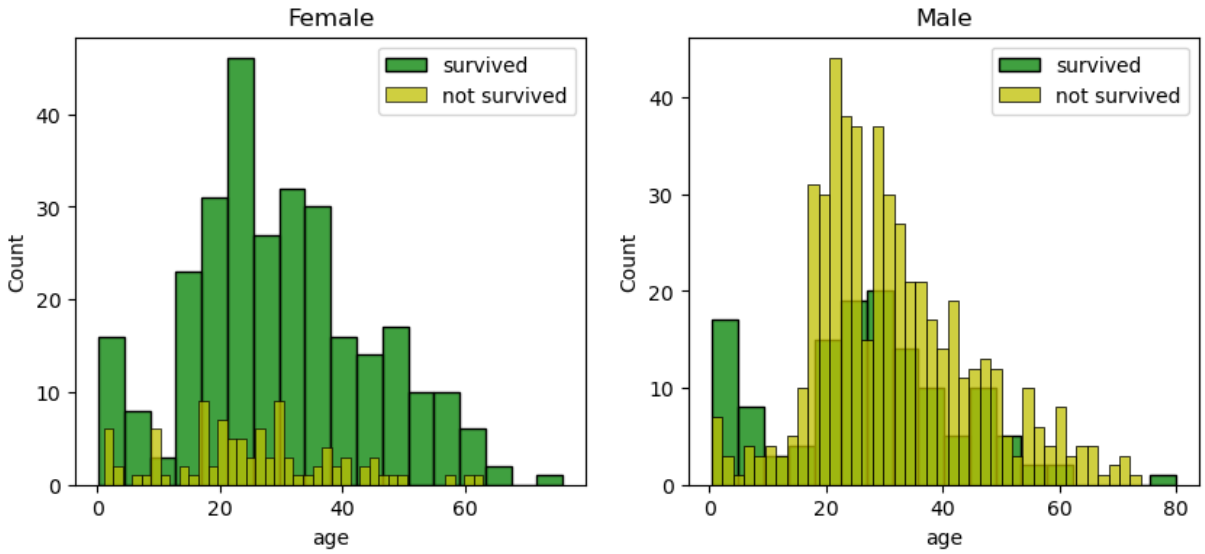
Out[11]:

	Total	%
body	1188	90.8
cabin	1014	77.5
boat	823	62.9
home.dest	564	43.1
age	263	20.1

In [86]:

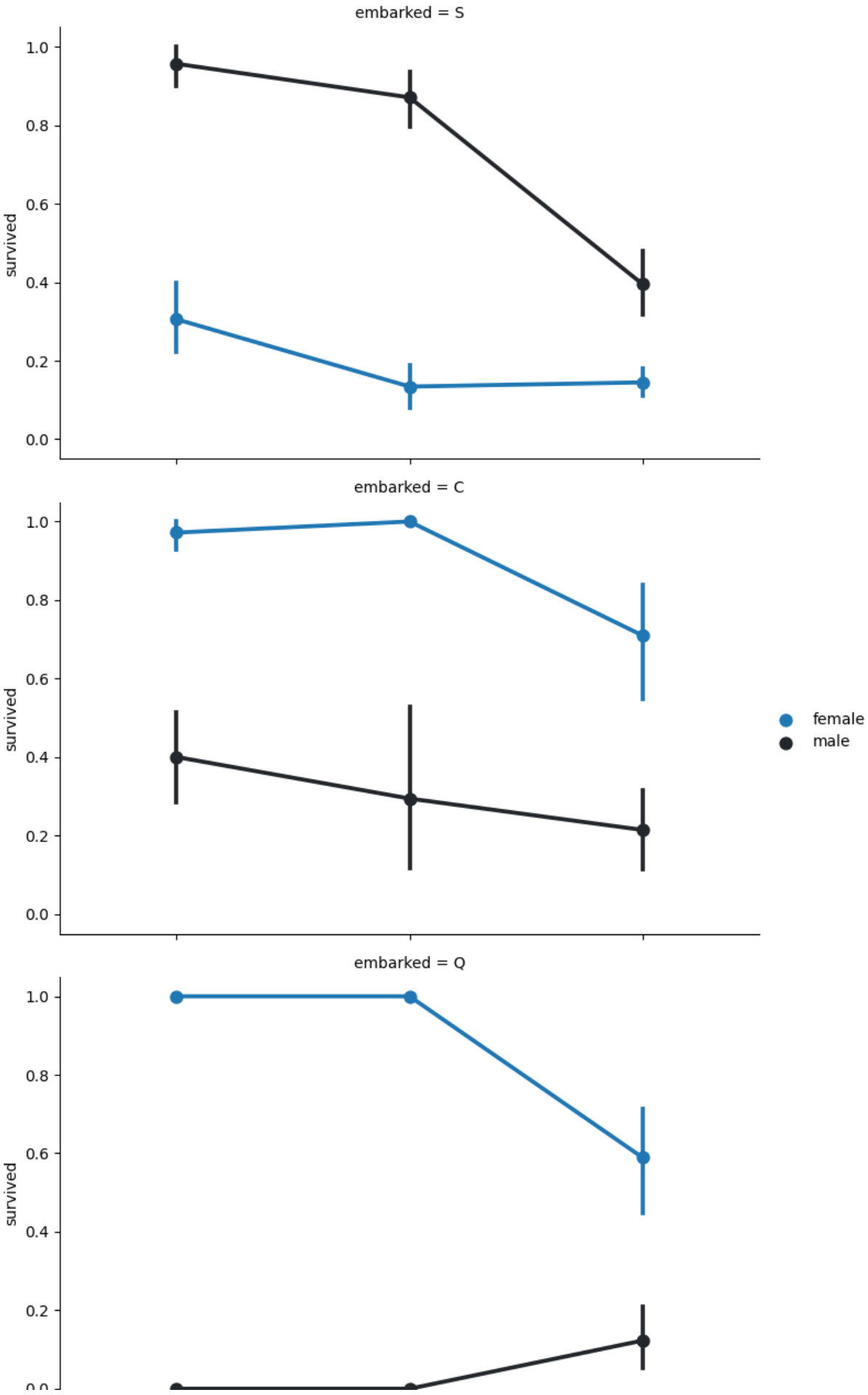
```
survived = 'survived'
not_survived = 'not survived'
fig, axes = plt.subplots(nrows=1, ncols=2, figsize=(10, 4))
women = df[df['sex']=='female']
men = df[df['sex']=='male']
ax = sns.histplot(women[women['survived']==1].age.dropna(), bins=18, label = surviv
ax = sns.histplot(women[women['survived']==0].age.dropna(), bins=40, label = not_su
ax.legend()
ax.set_title('Female')
ax = sns.histplot(men[men['survived']==1].age.dropna(), bins=18, label = survived,
ax = sns.histplot(men[men['survived']==0].age.dropna(), bins=40, label = not_surviv
ax.legend()
_ = ax.set_title('Male')
```

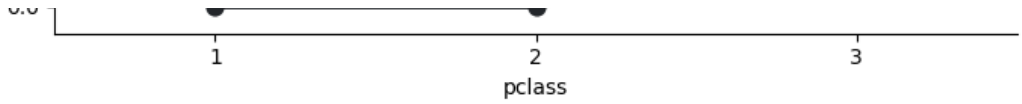
```
D:\APP\Anaconda\Lib\site-packages\seaborn\_oldcore.py:1119: FutureWarning: use_inf_a
s_na option is deprecated and will be removed in a future version. Convert inf value
s to NaN before operating instead.
  with pd.option_context('mode.use_inf_as_na', True):
D:\APP\Anaconda\Lib\site-packages\seaborn\_oldcore.py:1119: FutureWarning: use_inf_a
s_na option is deprecated and will be removed in a future version. Convert inf value
s to NaN before operating instead.
  with pd.option_context('mode.use_inf_as_na', True):
D:\APP\Anaconda\Lib\site-packages\seaborn\_oldcore.py:1119: FutureWarning: use_inf_a
s_na option is deprecated and will be removed in a future version. Convert inf value
s to NaN before operating instead.
  with pd.option_context('mode.use_inf_as_na', True):
D:\APP\Anaconda\Lib\site-packages\seaborn\_oldcore.py:1119: FutureWarning: use_inf_a
s_na option is deprecated and will be removed in a future version. Convert inf value
s to NaN before operating instead.
  with pd.option_context('mode.use_inf_as_na', True):
```



In [18]:
```
FacetGrid = sns.FacetGrid(df, row='embarked', height=4.5, aspect=1.6)
FacetGrid.map(sns.pointplot, 'pclass', 'survived', 'sex', palette=None, order=None,
FacetGrid.add_legend()
```

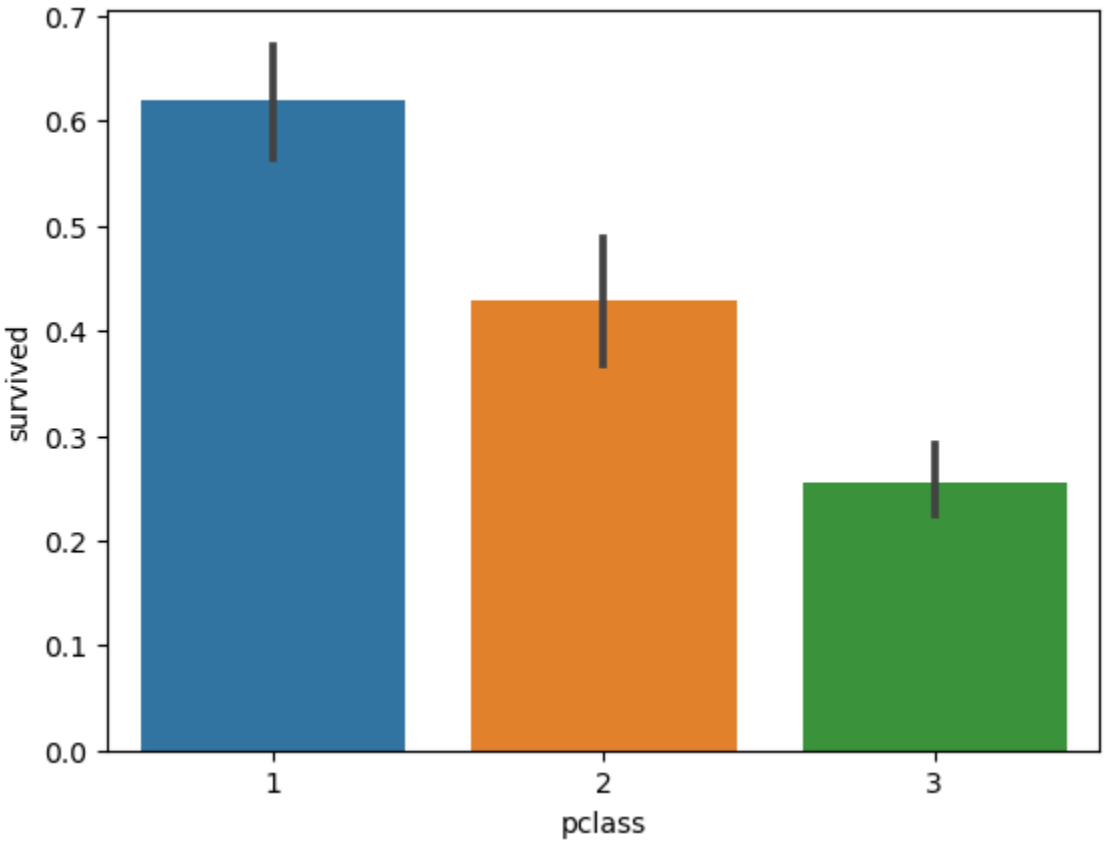
Out[18]: <seaborn.axisgrid.FacetGrid at 0x2881ba86a50>


embarked = S
embarked = C
embarked = Q
survived
1.0
0.8
0.6
0.4
0.2
0.0
female
male

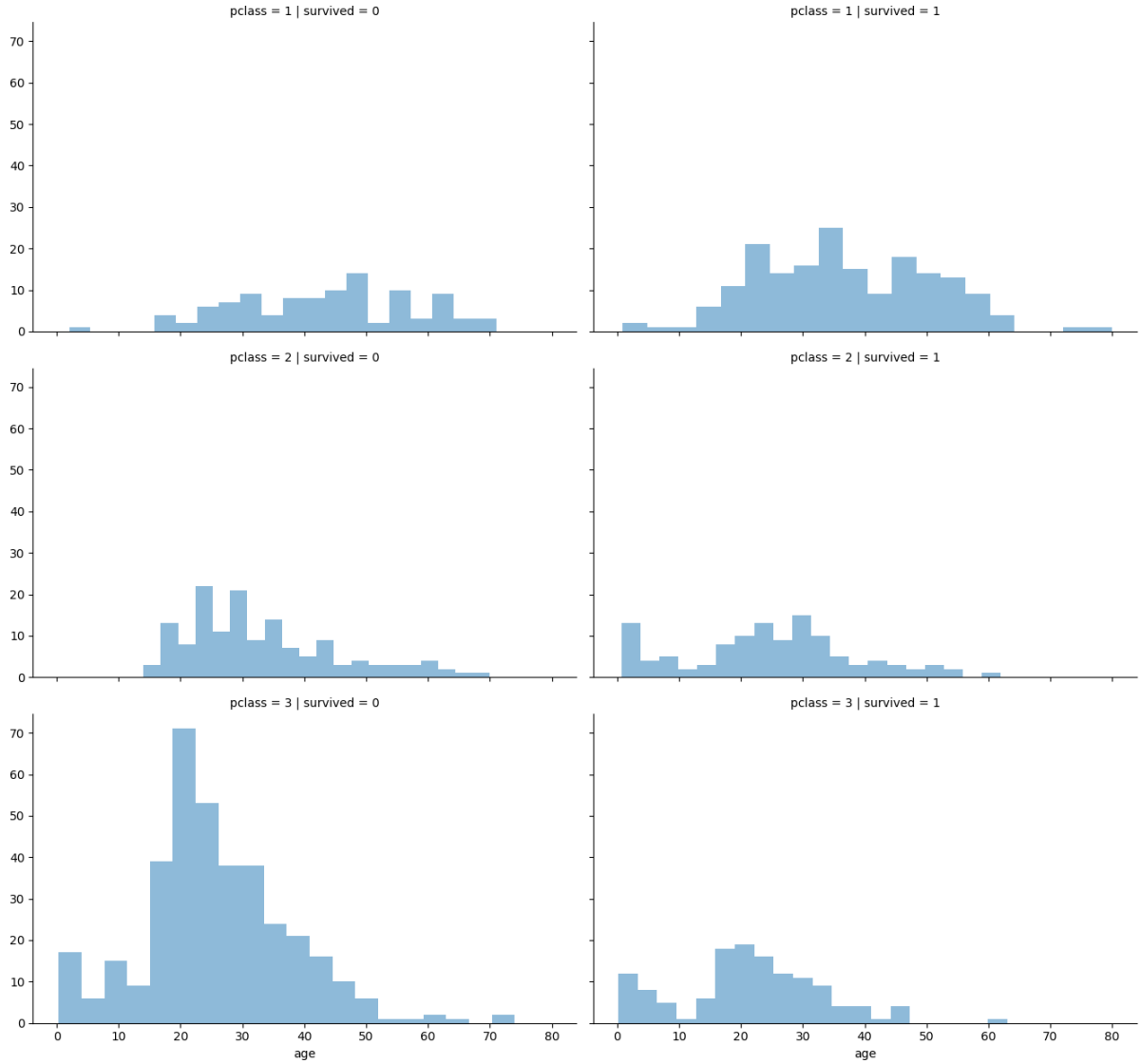


In [87]:
```
sns.barplot(x='pclass', y='survived', data=df)
```

Out[87]: <Axes: xlabel='pclass', ylabel='survived'>



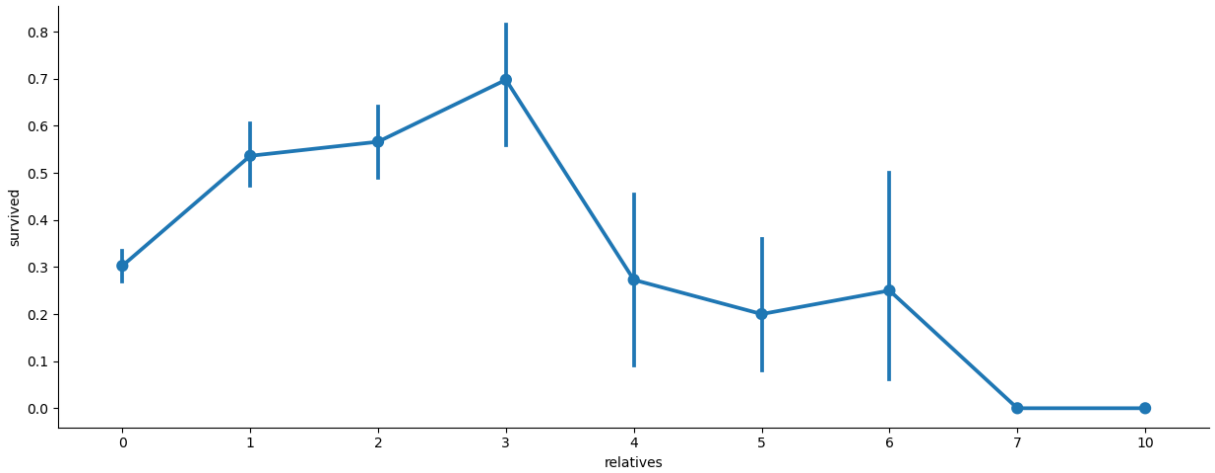
In [88]:
```
grid = sns.FacetGrid(df, col='survived', row='pclass', height=4.2, aspect=1.6)
grid.map(plt.hist, 'age', alpha=.5, bins=20)
grid.add_legend();
```



In [89]:
```
for dataset in [df]:
                    dataset['relatives'] = dataset['sibsp'] + dataset['parch']
                    dataset.loc[dataset['relatives'] > 0, 'not_alone'] = 0
                    dataset.loc[dataset['relatives'] == 0, 'not_alone'] = 1
                    dataset['not_alone'] = dataset['not_alone'].astype(int)
df['not_alone'].value_counts()
```

Out[89]:
```
not_alone
1    790
0    519
Name: count, dtype: int64
```

In [90]:
```
axes = sns.catplot(x='relatives', y='survived', data=df, aspect=2.5, kind='point')
```



In [91]:
```
import re
deck = {"A": 1, "B": 2, "C": 3, "D": 4, "E": 5, "F": 6, "G": 7, "U": 8}
for dataset in [df]:
    dataset['cabin'] = dataset['cabin'].fillna("U0")
    dataset['deck'] = dataset ['cabin'].map(lambda x: re.compile("([a-zA-Z]+)").sea
    dataset['deck'] = dataset['deck'].map(deck)
    dataset['deck'] = dataset['deck'].fillna(0)
    dataset['deck'] = dataset['deck'].astype(int)

df=df.drop(['cabin'],axis=1)
```

In [92]:
```
df['ticket'].describe()
```

Out[92]:
```
count         1309
unique         929
top       CA. 2343
freq             11
Name: ticket, dtype: object
```

In [93]:
```
df = df.drop(['ticket'], axis=1)
df = df.drop(['boat'], axis=1)
df = df.drop(['body'], axis=1)
df = df.drop(['home.dest'], axis=1)
```

In [94]:
```
for dataset in [df]:
    mean = df["age"].mean()
    std = df["age"].std()
    is_null = dataset["age"].isnull().sum()
    rand_age = np.random.randint(mean-std,mean+std,size=is_null)
    age_slice  = dataset["age"].copy()
    age_slice[np.isnan(age_slice)]= rand_age
    dataset["age"]=age_slice
    dataset["age"]=df["age"].astype(int)
df["age"].isnull().sum()
```

Out[94]:
```
0
```

In [95]:
```
df['embarked'].describe()
```

Out[95]:
```
count     1307
unique       3
top          S
freq       914
Name: embarked, dtype: object
```

In [96]:
```
common_value='S'

for dataset in [df]:
    dataset['embarked'] = dataset['embarked'].fillna(common_value)
```

In [97]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 1309 entries, 0 to 1308
Data columns (total 12 columns):
 #   Column     Non-Null Count  Dtype  
---  ------     --------------  -----  
 0   pclass     1309 non-null   int64  
 1   survived   1309 non-null   int64  
 2   name       1309 non-null   object 
 3   sex        1309 non-null   object 
 4   age        1309 non-null   int32  
 5   sibsp      1309 non-null   int64  
 6   parch      1309 non-null   int64  
 7   fare       1308 non-null   float64
 8   embarked   1309 non-null   object 
 9   relatives  1309 non-null   int64  
 10  not_alone  1309 non-null   int32  
 11  deck       1309 non-null   int32  
dtypes: float64(1), int32(3), int64(5), object(3)
memory usage: 107.5+ KB
```

In [98]:
```
for dataset in [df]:
    dataset['fare']=dataset['fare'].fillna(0)
    dataset['fare']=dataset['fare'].astype(int)
```

In [99]:
```
titles ={"Mr":1, "Miss":2, "Mrs":3, "Master":4,"Rare":5}

for dataset in [df]:
    dataset['title'] = dataset.name.str.extract('([A-Za-z]+)\.',expand=False)
    dataset['title'] = dataset['title'].replace(['Lady','Countess','Capt','Col','Do
                                                 'Major','Rev','Sir','Jonkheer','Don
    dataset['title'] = dataset['title'].replace('Mlle','Miss')
    dataset['title'] = dataset['title'].replace('Ms','Miss')
    dataset['title'] = dataset['title'].replace('Mme','Mrs')
    #convert
    dataset['title']=dataset['title'].map(titles)
    #filling NaNy with 0
    dataset['title']=dataset['title'].fillna(0)
df =df.drop(['name'],axis=1)
```

In [100…
```
genders ={"male":0,"female":1}

for dataset in [df]:
```

```
    dataset['sex']=dataset['sex'].map(genders)
```

In [101…
```
ports = {"S":0,"C":1,"Q":2}

for dataset in [df]:
    dataset['embarked']= dataset['embarked'].map(ports)
```

In [102…
```
for dataset in [df]:
    dataset['age']=dataset['age'].astype(int)
    dataset.loc[dataset['age']<=11,'age']=0
    dataset.loc[(dataset['age']>11) & (dataset['age']<=18),'age']=1
    dataset.loc[(dataset['age']>18) & (dataset['age']<=22),'age']=2
    dataset.loc[(dataset['age']>22) & (dataset['age']<=27),'age']=3
    dataset.loc[(dataset['age']>27) & (dataset['age']<=33),'age']=4
    dataset.loc[(dataset['age']>33) & (dataset['age']<=40),'age']=5
    dataset.loc[(dataset['age']>40) & (dataset['age']<=66),'age']=6
    dataset.loc[dataset['age']>66,'age']=7
```

In [103…
```
df['age'].value_counts()
```

Out[103…
```
age
6    241
4    219
3    218
5    213
2    178
1    140
0     91
7      9
Name: count, dtype: int64
```

In [104…
```
for dataset in [df]:
    dataset.loc[dataset['fare']<=7.91,'fare']=0
    dataset.loc[(dataset['fare']>7.91) & (dataset['fare']<=14.454),'fare']=1
    dataset.loc[(dataset['fare']>14.454) & (dataset['fare']<=31),'fare']=2
    dataset.loc[(dataset['fare']>31) & (dataset['fare']<=99),'fare']=3
    dataset.loc[(dataset['fare']>99) & (dataset['fare']<=250),'fare']=4
    dataset.loc[dataset['fare']>250,'fare']=5
    dataset['fare']=dataset['fare'].astype(int)
```

In [105…
```
for dataset in [df]:
    dataset['age_class']= dataset['age']*dataset['pclass']
```

In [106…
```
for dataset in [df]:
    dataset['fare_per_person']= dataset['fare']/(dataset['relatives']+1)
    dataset['fare_per_person']= dataset['fare_per_person'].astype(int)
df.head(10)
```

Out[106…

	pclass	survived	sex	age	sibsp	parch	fare	embarked	relatives	not_alone	deck	ti
0	1	1	1	4	0	0	4	0	0	1	2	
1	1	1	0	0	1	2	4	0	3	0	3	
2	1	0	1	0	1	2	4	0	3	0	3	
3	1	0	0	4	1	2	4	0	3	0	3	
4	1	0	1	3	1	2	4	0	3	0	3	
5	1	1	0	6	0	0	2	0	0	1	5	
6	1	1	1	6	1	0	3	0	1	0	4	
7	1	0	0	5	0	0	0	0	0	1	1	
8	1	1	1	6	2	0	3	0	2	0	3	
9	1	0	0	7	0	0	3	1	0	1	8	

In [ ]: