Titanic - Project

September 18, 2015

0.1 Import Libraries

In [252]:
```
import numpy as np
import pandas as pd
from pandas import Series, DataFrame
import matplotlib as mpl
import matplotlib.pyplot as plt
import seaborn as sns
%matplotlib inline

# Set default matplot figure size
pylab.rcParams['figure.figsize'] = (10.0, 8.0)
```

0.2 Reading Data Set using Pandas

In [135]:
```
titanic_df = pd.read_csv('train.csv')
```

0.3 Analysis

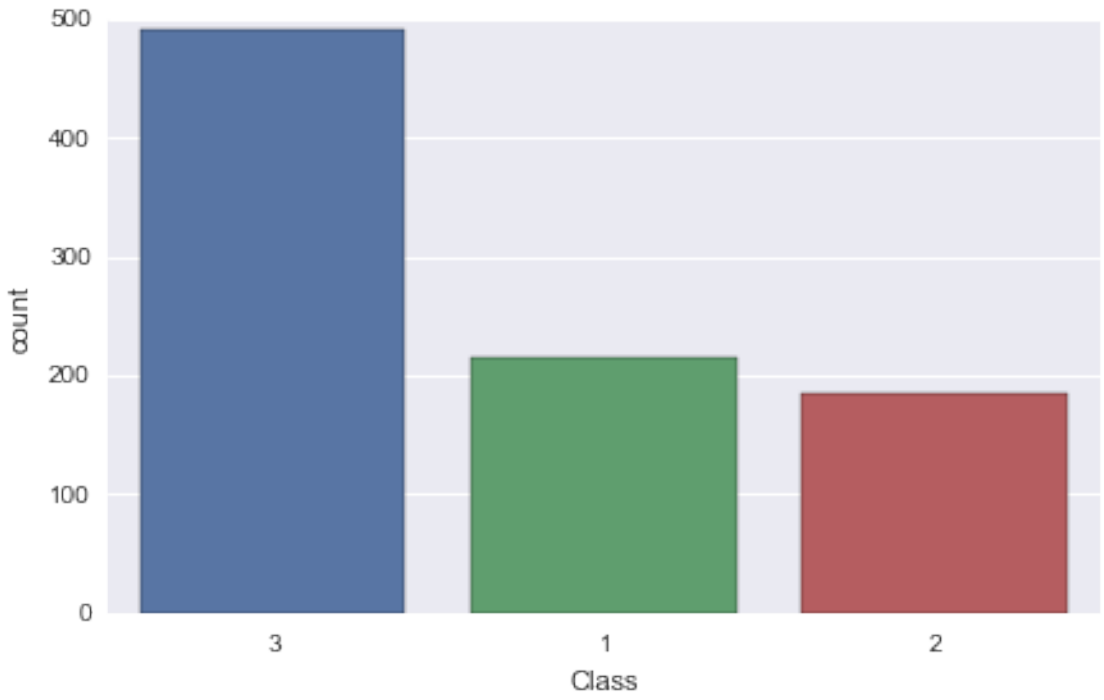
In [136]:
```
# Check the first 5 rows of the data frame
titanic_df.head()
```

Out[136]:

	PassengerId	Survived	Pclass	Name	Sex	Age	SibSp	Parch	Ticket	Fare	Cabin	Embarked
0	1	0	3	Braund, Mr. Owen Harris	male	22	1	0	A/5 21171	7.2500	NaN	S
1	2	1	1	Cumings, Mrs. John Bradley (Florence Briggs Th...	female	38	1	0	PC 17599	71.2833	C85	C
2	3	1	3	Heikkinen, Miss. Laina	female	26	0	0	STON/O2. 3101282	7.9250	NaN	S
3	4	1	1	Futrelle, Mrs. Jacques Heath (Lily May Peel)	female	35	1	0	113803	53.1000	C123	S
4	5	0	3	Allen, Mr. William Henry	male	35	0	0	373450	8.0500	NaN	S

In [137]:
```
# Column names
titanic_df.columns
```

```
Out[137]: 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')

In [138]: # Information about the data set
          titanic_df.info()

<class 'pandas.core.frame.DataFrame'>
Int64Index: 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: 73.1+ KB

In [143]: # Number of passengers in each class
          titanic_df.groupby('Pclass')['Pclass'].count()

Out[143]: Pclass
          1    216
          2    184
          3    491
          Name: Pclass, dtype: int64

In [205]: # Instead of a group by, use seaborn to plot the count of passengers in each class
          fg = sns.factorplot('Pclass', data=titanic_df, kind='count', aspect=1.5)
          fg.set_xlabels('Class')

Out[205]: <seaborn.axisgrid.FacetGrid at 0xa59e34ec>
```

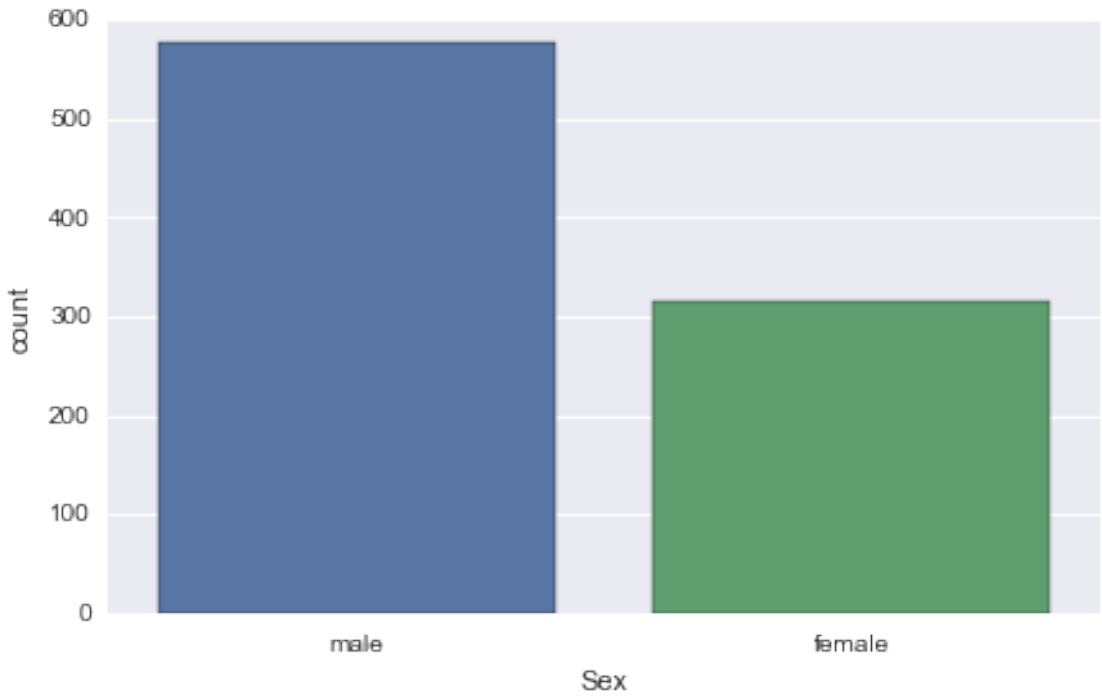



```
In [29]: titanic_df.groupby('Sex')['Sex'].count()
```

```
Out[29]: Sex
         female    314
         male      577
         Name: Sex, dtype: int64
```

```
In [199]: # Instead of a group by, use seaborn to plot the number of males and females
          sns.factorplot('Sex', data=titanic_df, kind='count', aspect=1.5)
```

```
Out[199]: <seaborn.axisgrid.FacetGrid at 0xa5b785ec>
```



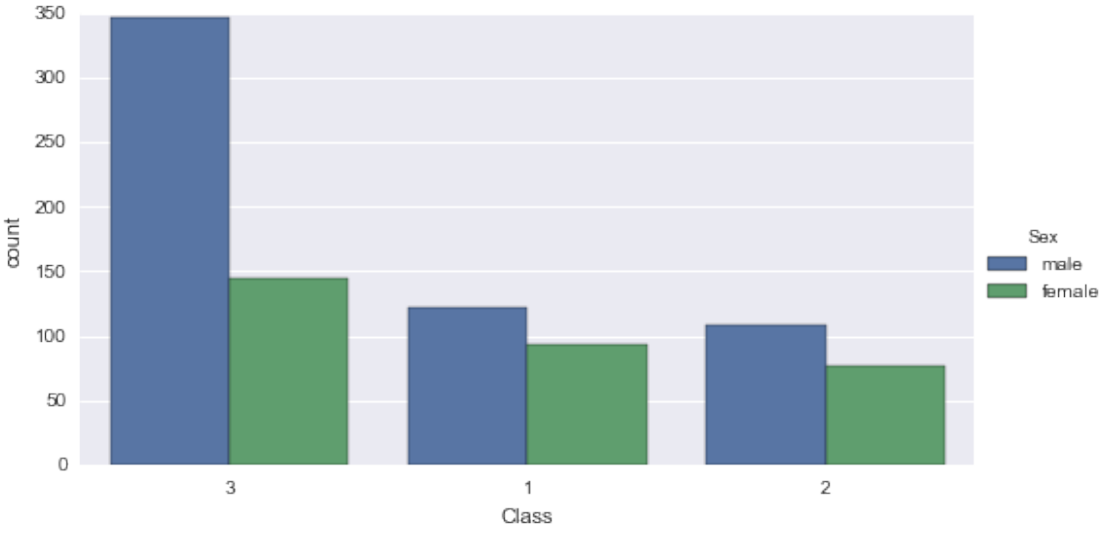
There are almost two times males as much as there were females.

```
In [34]: # Number of men and women in each of the passenger class
         titanic_df.groupby(['Sex', 'Pclass'])['Sex'].count()
```

```
Out[34]: Sex     Pclass
         female  1          94
                 2          76
                 3         144
         male    1         122
                 2         108
                 3         347
         Name: Sex, dtype: int64
```

```
In [207]: # Again use saeborn to group by Sex and class
          g = sns.factorplot('Pclass', data=titanic_df, hue='Sex', kind='count', aspect=1.75)
          g.set_xlabels('Class')
```

```
Out[207]: <seaborn.axisgrid.FacetGrid at 0xa560c10c>
```



As shown in the figure above, there are more than two times males than females in class 3. However, in classes 1 and 2, the ratio of male to female is almost 1.

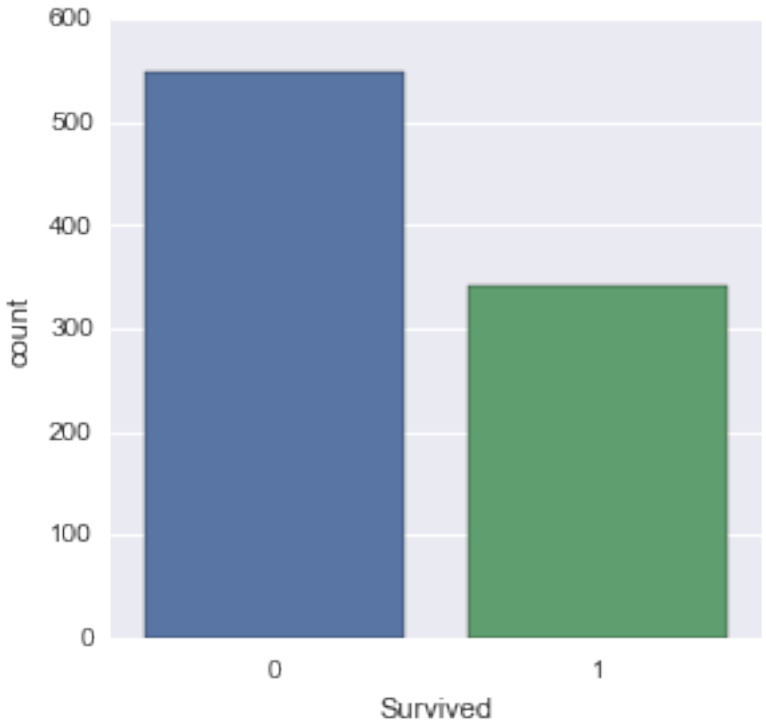
```
In [79]: # Number of passengers who survived in each class grouped by sex. Also total was found for eac
         titanic_df.pivot_table('Survived', 'Sex', 'Pclass', aggfunc=np.sum, margins=True)
```

```
Out[79]: Pclass    1   2    3  All
         Sex
         female   91  70   72  233
         male     45  17   47  109
         All     136  87  119  342
```

```
In [65]: not_survived = titanic_df[titanic_df['Survived']==0]
```

```
In [357]: # Factor plot of those who survived vs. who didn't
          sns.factorplot('Survived', data=titanic_df, kind='count')
```

```
Out[357]: <seaborn.axisgrid.FacetGrid at 0x9e2f9bac>
```




```
In [68]: # Total number of passengers who didn't survive
         len(not_survived)
```

```
Out[68]: 549
```

```
In [76]: # Number of passengers who did not survive in each class grouped by sex.
         not_survived.pivot_table('Survived', 'Sex', 'Pclass', aggfunc=len, margins=True)
```

```
Out[76]: Pclass   1   2    3  All
         Sex
         female   3   6   72   81
         male    77  91  300  468
         All     80  97  372  549
```

```
In [215]: # Passengers who survived and who didn't survive grouped by class and sex
          table = pd.crosstab(index=[titanic_df.Survived,titanic_df.Pclass], columns=[titanic_df.Sex,ti
```

```
In [111]: table.unstack()
```

```
Out[111]: Sex      female                           male                          \
          Embarked      C         Q         S          C         Q         S
          Pclass        1  2   3  1  2   3   1   2   3   1  2   3  1  2   3   1   2
          Survived
          0             1  0   8  0  0   9   2   6  55  25  8  33  1  1  36  51  82
          1            42  7  15  1  2  24  46  61  33  17  2  10  0  0   3  28  15

          Sex
          Embarked
```

```
Pclass      3
Survived
0         231
1          34
```

```
In [225]: table.columns, table.index
```

```
Out[225]: (MultiIndex(levels=[[u'Female', u'Male'], [u'Cherbourg', u'Queenstown', u'Southampton']],
                      labels=[[0, 0, 0, 1, 1, 1], [0, 1, 2, 0, 1, 2]],
                      names=[u'Sex', u'Embarked']),
           MultiIndex(levels=[[0, 1], [1, 2, 3]],
                      labels=[[0, 0, 0, 1, 1, 1], [0, 1, 2, 0, 1, 2]],
                      names=[u'Survived', u'Pclass']))
```

```
In [224]: # Change name of columns
          table.columns.set_levels(['Female', 'Male'], level=0, inplace=True)
          table.columns.set_levels(['Cherbourg','Queenstown','Southampton'], level=1, inplace=True)
          table
```

```
Out[224]: Sex                Female                            Male             \
          Embarked        Cherbourg Queenstown Southampton Cherbourg Queenstown
          Survived Pclass
          0        1              1          0           2        25          1
                   2              0          0           6         8          1
                   3              8          9          55        33         36
          1        1             42          1          46        17          0
                   2              7          2          61         2          0
                   3             15         24          33        10          3

          Sex
          Embarked        Southampton
          Survived Pclass
          0        1               51
                   2               82
                   3              231
          1        1               28
                   2               15
                   3               34
```

```
In [241]: print('Average and median age of passengers are %0.f and %0.f years old, respectively'%(titani
                                                                                                  titanic_df.Age.media
```

```
Average and median age of passengers are 30 and 28 years old, respectively
```

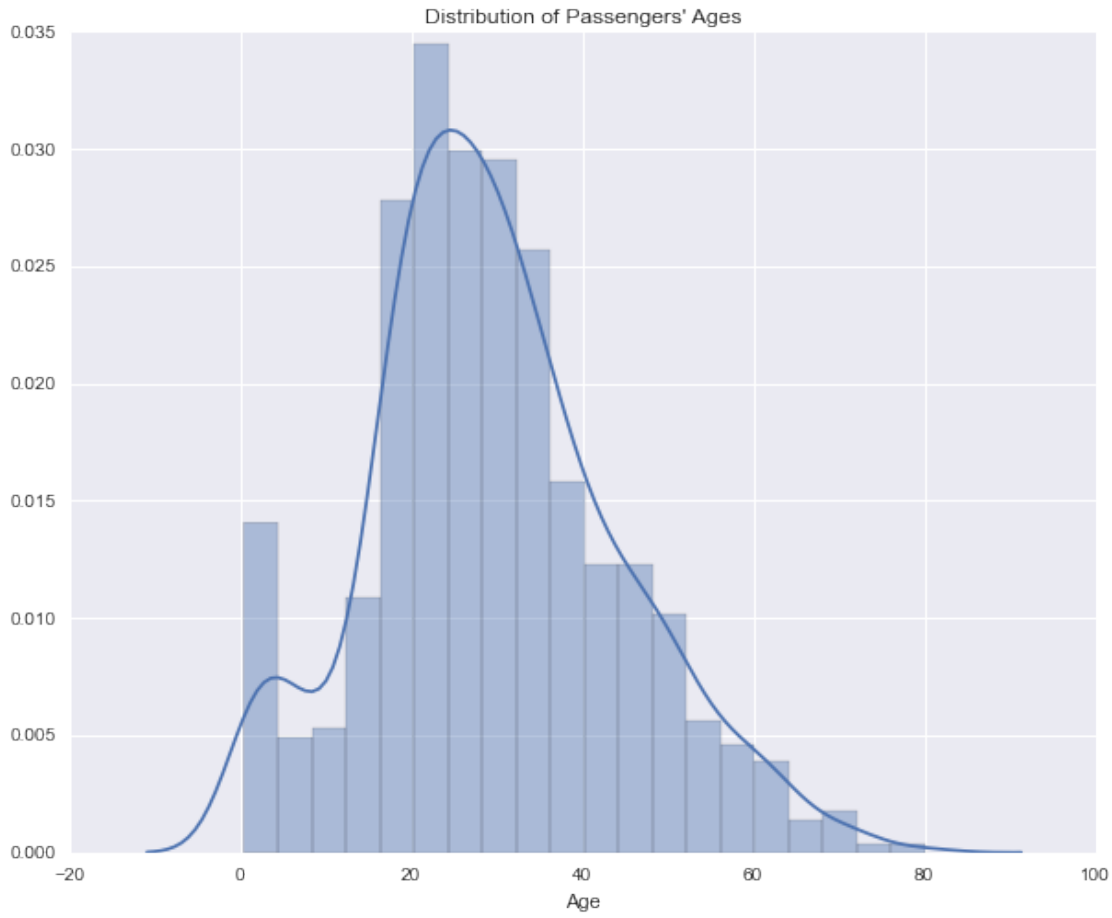
```
In [246]: titanic_df.Age.describe()
```

```
Out[246]: count    714.000000
          mean      29.699118
          std       14.526497
          min        0.420000
          25%       20.125000
          50%       28.000000
          75%       38.000000
          max       80.000000
          Name: Age, dtype: float64
```

In [314]:
```
# Drop missing values for the records in which age passenger is missing
age = titanic_df['Age'].dropna()
```

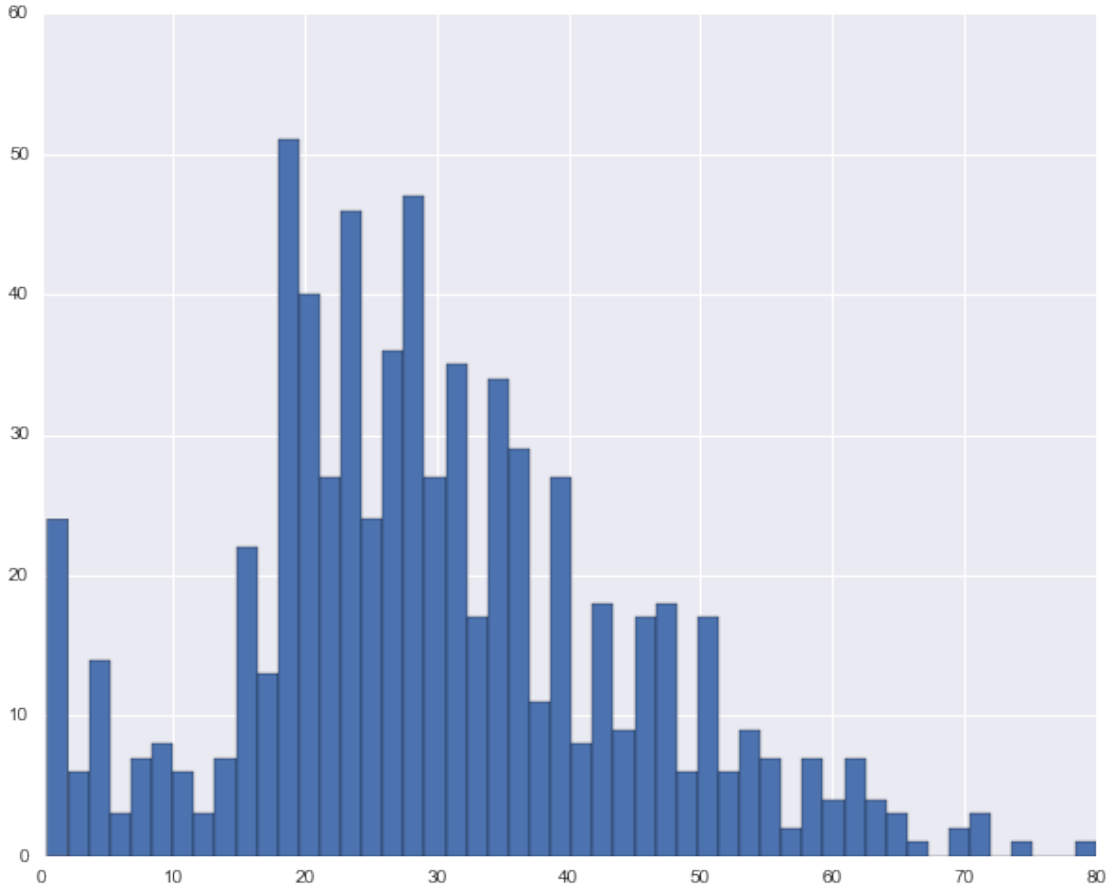
In [347]:
```
# Distribution of age, with an overlay of a density plot
age_dist = sns.distplot(age)
age_dist.set_title("Distribution of Passengers' Ages")
```

Out[347]:
```
<matplotlib.text.Text at 0x9ff81f2c>
```



In [348]:
```
# Another way to plot a histogram of ages is shown below
titanic_df['Age'].hist(bins=50)
```

Out[348]:
```
<matplotlib.axes._subplots.AxesSubplot at 0x9fe3140c>
```

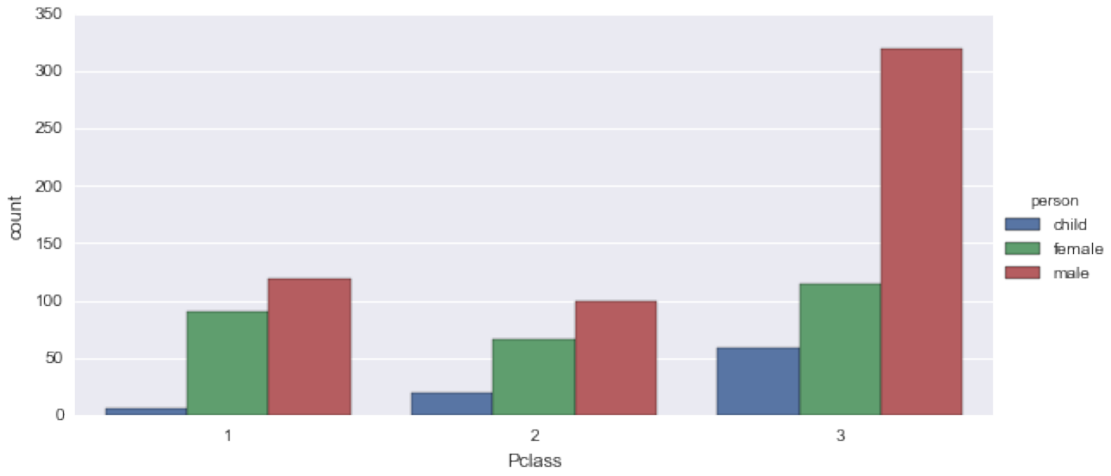



```
In [327]: titanic_df['Parch'].dtype, titanic_df['SibSp'].dtype, len(titanic_df.Cabin.dropna())

Out[327]: (dtype('int64'), dtype('int64'), 204)

In [331]: # Create a function to define those who are children (less than 16)
          def male_female_child(passenger):
              age, sex = passenger

              if age < 16:
                  return 'child'
              else:
                  return sex

In [332]: titanic_df['person'] = titanic_df[['Age', 'Sex']].apply(male_female_child, axis=1)

In [338]: # Lets have a look at the first 10 rows of the data frame
          titanic_df[:10]

Out[338]:    PassengerId  Survived  Pclass  \
          0            1         0       3
          1            2         1       1
          2            3         1       3
          3            4         1       1
```

```
4            5         0       3
5            6         0       3
6            7         0       1
7            8         0       3
8            9         1       3
9           10         1       2

                                                Name     Sex  Age  SibSp  \
0                            Braund, Mr. Owen Harris    male   22      1
1  Cumings, Mrs. John Bradley (Florence Briggs Th...  female   38      1
2                             Heikkinen, Miss. Laina  female   26      0
3       Futrelle, Mrs. Jacques Heath (Lily May Peel)  female   35      1
4                           Allen, Mr. William Henry    male   35      0
5                                   Moran, Mr. James    male  NaN      0
6                            McCarthy, Mr. Timothy J    male   54      0
7                     Palsson, Master. Gosta Leonard    male    2      3
8  Johnson, Mrs. Oscar W (Elisabeth Vilhelmina Berg)  female   27      0
9                Nasser, Mrs. Nicholas (Adele Achem)  female   14      1

   Parch            Ticket     Fare Cabin Embarked  person
0      0         A/5 21171   7.2500   NaN        S    male
1      0          PC 17599  71.2833   C85        C  female
2      0  STON/O2. 3101282   7.9250   NaN        S  female
3      0            113803  53.1000  C123        S  female
4      0            373450   8.0500   NaN        S    male
5      0            330877   8.4583   NaN        Q    male
6      0             17463  51.8625   E46        S    male
7      1            349909  21.0750   NaN        S   child
8      2            347742  11.1333   NaN        S  female
9      0            237736  30.0708   NaN        C   child
```

In [454]:
```
# Lets do a factorplot of passengers splitted into sex, children and class
sns.factorplot('Pclass', data=titanic_df, kind='count', hue='person', order=[1,2,3],
               hue_order=['child','female','male'], aspect=2)
```

Out[454]:
```
<seaborn.axisgrid.FacetGrid at 0x9a2dbd8c>
```

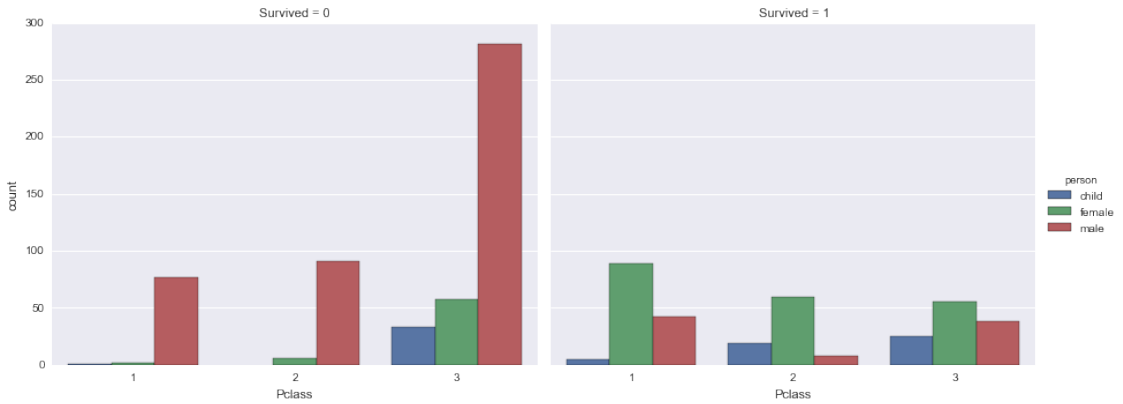


```
In [354]: # Count number of men, women and children
          titanic_df['person'].value_counts()
```

```
Out[354]: male      537
          female    271
          child      83
          dtype: int64
```

```
In [353]: # Do the same as above, but split the passengers into either survived or not
          sns.factorplot('Pclass', data=titanic_df, kind='count', hue='person', col='Survived', order=[
                         hue_order=['child','female','male'], aspect=1.25, size=5)
```

```
Out[353]: <seaborn.axisgrid.FacetGrid at 0x9eb75ecc>
```



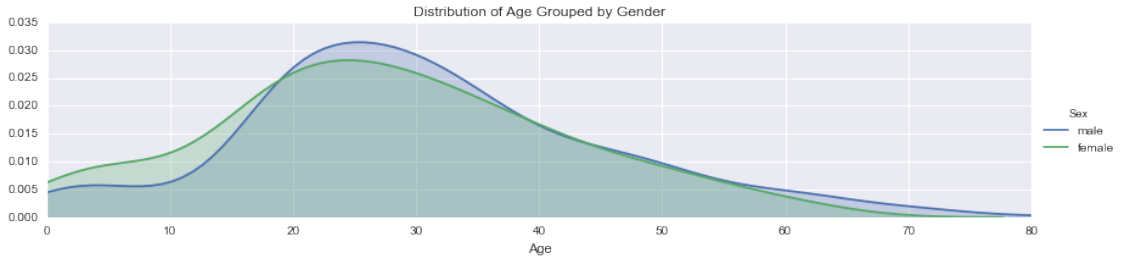
There are much more children in third class than there are in first and second class. However, one may expect that there woould be more children in 1st and 2nd class than there are in 3rd class.

0.3.1 kde plot, Distribution of Passengers' Ages

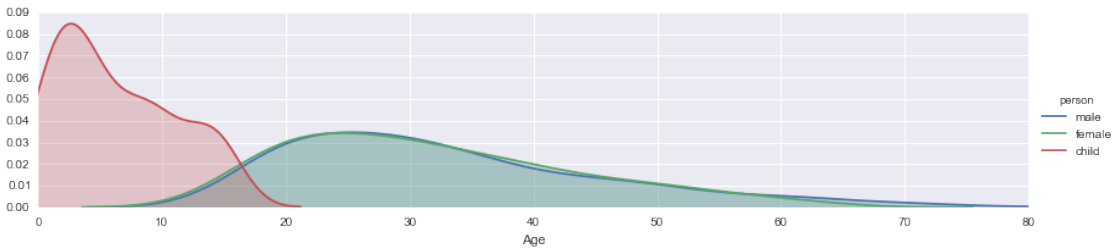
Grouped by Gender

```
In [364]: fig = sns.FacetGrid(titanic_df, hue='Sex', aspect=4)
          fig.map(sns.kdeplot, 'Age', shade=True)
          oldest = titanic_df['Age'].max()
          fig.set(xlim=(0,oldest))
          fig.set(title='Distribution of Age Grouped by Gender')
          fig.add_legend()
```

```
Out[364]: <seaborn.axisgrid.FacetGrid at 0x9abecacc>
```

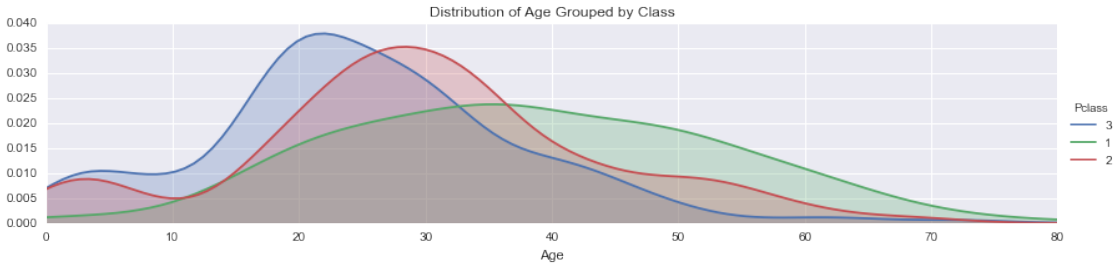


```
In [366]: fig = sns.FacetGrid(titanic_df, hue='person', aspect=4)
          fig.map(sns.kdeplot, 'Age', shade=True)
          oldest = titanic_df['Age'].max()
          fig.set(xlim=(0,oldest))
          fig.add_legend()

Out[366]: <seaborn.axisgrid.FacetGrid at 0x9abd4bac>
```



Grouped by Class

```
In [367]: fig = sns.FacetGrid(titanic_df, hue='Pclass', aspect=4)
          fig.map(sns.kdeplot, 'Age', shade=True)
          oldest = titanic_df['Age'].max()
          fig.set(xlim=(0,oldest))
          fig.set(title='Distribution of Age Grouped by Class')
          fig.add_legend()

Out[367]: <seaborn.axisgrid.FacetGrid at 0x9a76c18c>
```



From the plot above, class 1 has a normal distribution. However, classes 2 and 3 have a skewed distribution towards 20 and 30-year old passengers.

What cabins did the Passengers stay in?

```
In [384]: deck = titanic_df['Cabin'].dropna()
          deck.head()

Out[384]: 1      C85
          3     C123
          6      E46
          10      G6
          11    C103
          Name: Cabin, dtype: object
```

In [388]:
```
# Grab the first letter of the cabin letter
d = []
for c in deck:
    d.append(c[0])
```

In [390]:
```
d[0:10]
```

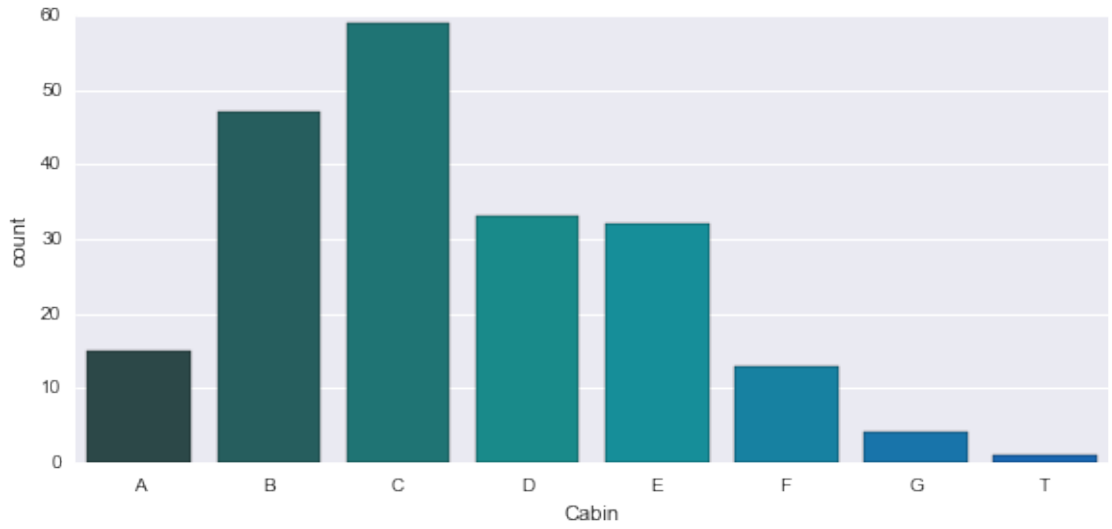
Out[390]:
```
['C', 'C', 'E', 'G', 'C', 'D', 'A', 'C', 'B', 'D']
```

In [398]:
```
from collections import Counter
Counter(d)
```

Out[398]:
```
Counter({'C': 59, 'B': 47, 'D': 33, 'E': 32, 'A': 15, 'F': 13, 'G': 4, 'T': 1})
```

In [410]:
```
# Now lets factorplot the cabins. First transfer the d list into a data frame. Then rename th
cabin_df = DataFrame(d)
cabin_df.columns=['Cabin']
sns.factorplot('Cabin', data=cabin_df, kind='count', order=['A','B','C','D','E','F','G','T'],
               palette='winter_d')
```

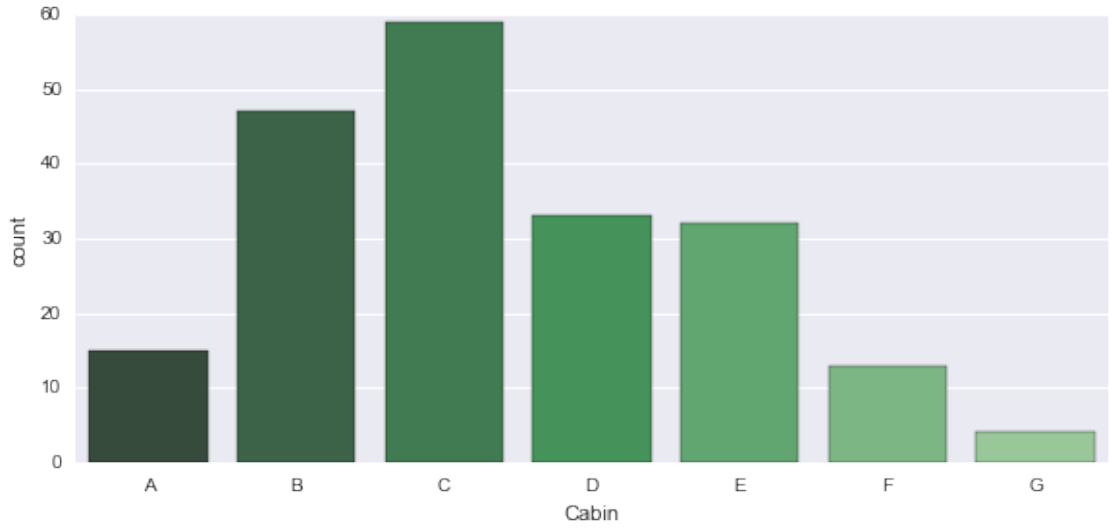
Out[410]:
```
<seaborn.axisgrid.FacetGrid at 0x99e810cc>
```



In [411]:
```
# Drop the 'T' cabin
cabin_df = cabin_df[cabin_df['Cabin'] != 'T']
```

In [433]:
```
# Then replot the Cabins factorplot as above
sns.factorplot('Cabin', data=cabin_df, kind='count', order=['A','B','C','D','E','F','G'], asp
               palette='Greens_d')
```

Out[433]:
```
<seaborn.axisgrid.FacetGrid at 0x98c849ac>
```



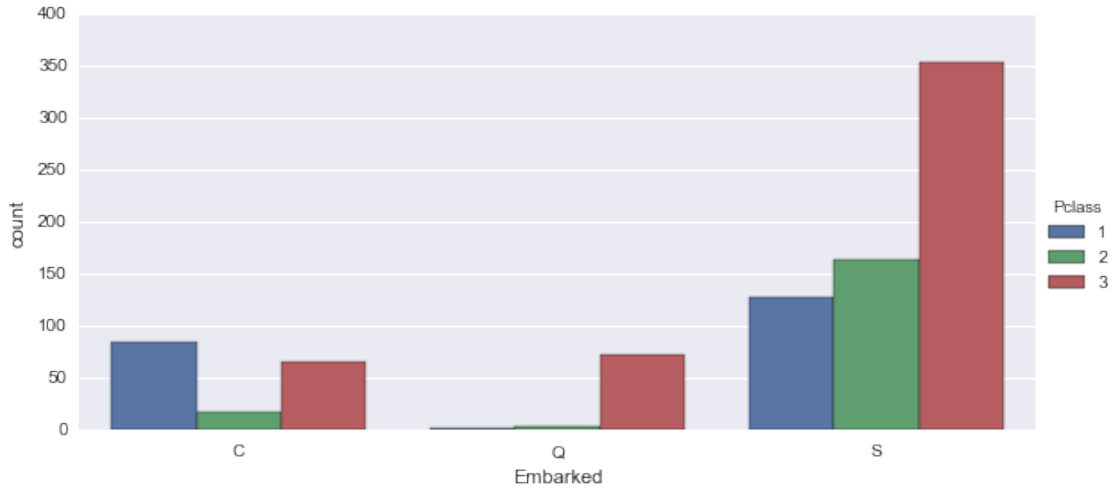

```
In [434]: # Below is a link to the list of matplotlib colormaps
          url = 'http://matplotlib.org/api/pyplot_summary.html?highlight=colormaps#matplotlib.pyplot.co
          import webbrowser
          webbrowser.open(url)
```

```
Out[434]: True
```

Where did the passengers come from i.e. Where did the passengers land into the ship from?

```
In [476]: sns.factorplot('Embarked', data=titanic_df, kind='count', hue='Pclass', hue_order=range(1,4),
                         order = ['C','Q','S'])
```

```
Out[476]: <seaborn.axisgrid.FacetGrid at 0x9866c76c>
```



From the figure above, one may conclude that almost all of the passengers who boarded from Queenstown were in third class. On the other hand, many who boarded from Cherbourg were in first class. The biggest

portion of passengers who boarded the ship came from Southampton, in which 353 passengers were in third class, 164 in second class and 127 passengers were in first class. In such cases, one may need to look at the economic situation at these different towns at that period of time to understand why most passengers who boarded from Queenstown were in third class for example.

```
In [453]: titanic_df.Embarked.value_counts()
```

```
Out[453]: S    644
          C    168
          Q     77
          dtype: int64
```

```
In [470]: # For tabulated values, use crosstab pandas method instead of the factorplot in seaborn
          port = pd.crosstab(index=[titanic_df.Pclass], columns=[titanic_df.Embarked])
          port.columns = [['Cherbourg','Queenstown','Southampton']]
```

```
In [466]: port
```

```
Out[466]:         Cherbourg  Queenstown  Southampton
          Pclass
          1              85           2          127
          2              17           3          164
          3              66          72          353
```

```
In [471]: port.index
```

```
Out[471]: Int64Index([1, 2, 3], dtype='int64', name=u'Pclass')
```

```
In [472]: port.columns
```

```
Out[472]: Index([u'Cherbourg', u'Queenstown', u'Southampton'], dtype='object')
```

```
In [473]: port.index=[['First','Second','Third']]
```

```
In [474]: port
```

```
Out[474]:         Cherbourg  Queenstown  Southampton
          First          85           2          127
          Second         17           3          164
          Third          66          72          353
```

Who was alone and who was with parents or siblings?

```
In [481]: titanic_df[['SibSp','Parch']].head()
```

```
Out[481]:    SibSp  Parch
          0      1      0
          1      1      0
          2      0      0
          3      1      0
          4      0      0
```

```
In [552]: # Alone dataframe i.e. the passenger has no siblings or parents
          alone_df = titanic_df[(titanic_df['SibSp'] == 0) & (titanic_df['Parch']==0)]
          # Add Alone column
          alone_df['Alone'] = 'Alone'
          # Not alone data frame i.e. the passenger has either a sibling or a parent.
```

```
        not_alone_df = titanic_df[(titanic_df['SibSp'] != 0) | (titanic_df['Parch']!=0)]
        not_alone_df['Alone'] = 'With family'

        # Merge the above dataframes
        comb = [alone_df, not_alone_df]
        # Merge and sort by index
        titanic_df = pd.concat(comb).sort_index()
```

```
/home/tarek/anaconda/lib/python2.7/site-packages/IPython/kernel/__main__.py:4: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the the caveats in the documentation: http://pandas.pydata.org/pandas-docs/stable/indexing.html#inde
/home/tarek/anaconda/lib/python2.7/site-packages/IPython/kernel/__main__.py:7: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the the caveats in the documentation: http://pandas.pydata.org/pandas-docs/stable/indexing.html#inde
```

```
In [519]: [len(alone_df), len(not_alone_df)]
```

```
Out[519]: [537, 354]
```

```
In [520]: # Show the first five records of the alone data frame
          alone_df.head()
```

```
Out[520]:     PassengerId  Survived  Pclass                      Name     Sex  Age  \
          2             3         1       3   Heikkinen, Miss. Laina  female   26
          4             5         0       3  Allen, Mr. William Henry    male   35
          5             6         0       3          Moran, Mr. James    male  NaN
          6             7         0       1   McCarthy, Mr. Timothy J    male   54
          11           12         1       1  Bonnell, Miss. Elizabeth  female   58

              SibSp  Parch            Ticket     Fare Cabin Embarked  person  Alone
          2       0      0  STON/O2. 3101282   7.9250   NaN        S  female  Alone
          4       0      0            373450   8.0500   NaN        S    male  Alone
          5       0      0            330877   8.4583   NaN        Q    male  Alone
          6       0      0             17463  51.8625   E46        S    male  Alone
          11      0      0            113783  26.5500  C103        S  female  Alone
```

```
In [521]: # Show the first five rows of the not alone data frame
          not_alone_df.head()
```

```
Out[521]:    PassengerId  Survived  Pclass  \
          0            1         0       3
          1            2         1       1
          3            4         1       1
          7            8         0       3
          8            9         1       3

                                                  Name     Sex  Age  SibSp  \
          0                            Braund, Mr. Owen Harris    male   22      1
          1  Cumings, Mrs. John Bradley (Florence Briggs Th...  female   38      1
          3      Futrelle, Mrs. Jacques Heath (Lily May Peel)  female   35      1
          7                     Palsson, Master. Gosta Leonard    male    2      3
          8  Johnson, Mrs. Oscar W (Elisabeth Vilhelmina Berg)  female   27      0
```

```
   Parch     Ticket     Fare Cabin Embarked  person        Alone
0      0  A/5 21171   7.2500   NaN        S    male  With family
1      0   PC 17599  71.2833   C85        C  female  With family
3      0     113803  53.1000  C123        S  female  With family
7      1     349909  21.0750   NaN        S   child  With family
8      2     347742  11.1333   NaN        S  female  With family
```

In [553]:
```
titanic_df.head()
```

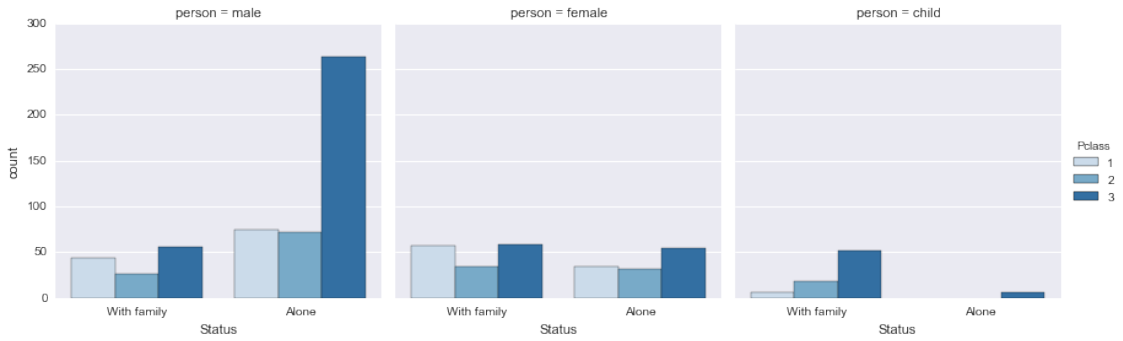
Out[553]:
```
   PassengerId  Survived  Pclass  \
0            1         0       3
1            2         1       1
2            3         1       3
3            4         1       1
4            5         0       3

                                                Name     Sex  Age  SibSp  \
0                            Braund, Mr. Owen Harris    male   22      1
1  Cumings, Mrs. John Bradley (Florence Briggs Th...  female   38      1
2                             Heikkinen, Miss. Laina  female   26      0
3       Futrelle, Mrs. Jacques Heath (Lily May Peel)  female   35      1
4                           Allen, Mr. William Henry    male   35      0

   Parch            Ticket     Fare Cabin Embarked  person        Alone
0      0         A/5 21171   7.2500   NaN        S    male  With family
1      0          PC 17599  71.2833   C85        C  female  With family
2      0  STON/O2. 3101282   7.9250   NaN        S  female        Alone
3      0            113803  53.1000  C123        S  female  With family
4      0            373450   8.0500   NaN        S    male        Alone
```

In [539]:
```
""" Another way to perform the above
titanic_df['Alone'] = titanic_df.SibSp + titanic_df.Parch

titanic_df['Alone'].loc[titanic_df['Alone']>0] = 'With family'
titanic_df['Alone'].loc[titanic_df['Alone']==0] = 'Alone'"""
```

Out[539]:
```
" Another way to perform the above\ntitanic_df['Alone'] = titanic_df.SibSp + titanic_df.Parch\
```

In [551]:
```
fg=sns.factorplot('Alone', data=titanic_df, kind='count', hue='Pclass', col='person', hue_ord
                  palette='Blues')
fg.set_xlabels('Status')
```

Out[551]:
```
<seaborn.axisgrid.FacetGrid at 0x9548b6cc>
```



From the figure above, it is clear that most children traveled with family in third class. For men, most traveled alone in third class. On the other hand, the number of female passengers who traveled either with family or alone among the second and third class is comparable. However, more women traveled with family than alone in first class.

0.3.2 Factors Affecting the Surviving

In [554]:
```
'''Now lets look at the factors that help someone survived the sinking. We start this analysi
cloumn to the titanic data frame. Use the Survived column to map to the new column with facto
using the map method'''
titanic_df['Survivor'] = titanic_df.Survived.map({0:'no', 1:'yes'})
```

In [555]:
```
titanic_df.head()
```

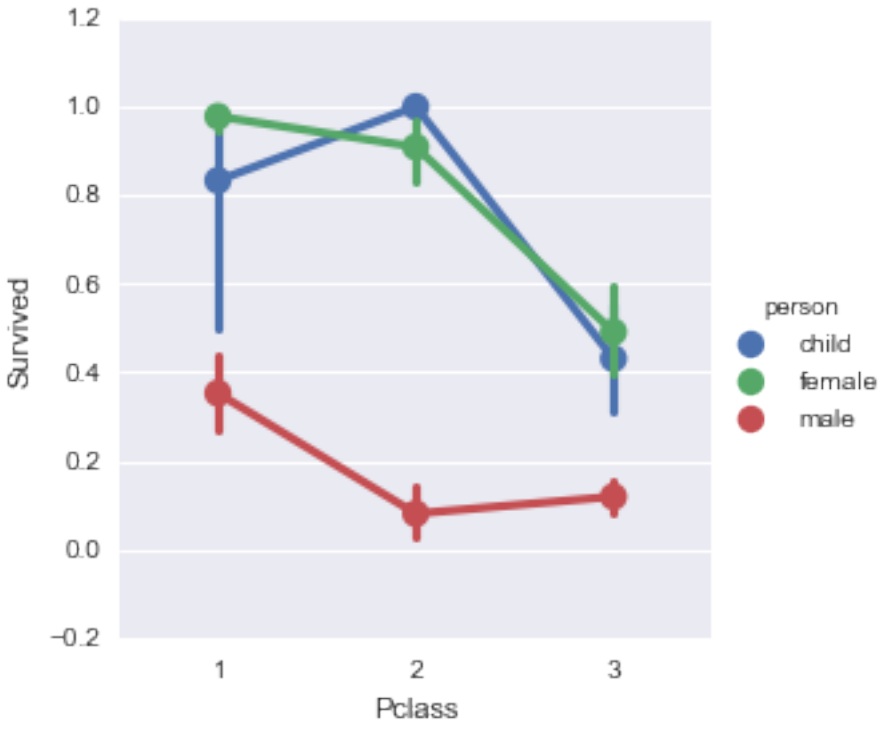
Out[555]:

	PassengerId	Survived	Pclass	Name	Sex	Age	SibSp	Parch	Ticket	Fare	Cabin	Embarked	person	Alone	Survivor
0	1	0	3	Braund, Mr. Owen Harris	male	22	1	0	A/5 21171	7.2500	NaN	S	male	With family	no
1	2	1	1	Cumings, Mrs. John Bradley (Florence Briggs Th...	female	38	1	0	PC 17599	71.2833	C85	C	female	With family	yes
2	3	1	3	Heikkinen, Miss. Laina	female	26	0	0	STON/O2. 3101282	7.9250	NaN	S	female	Alone	yes
3	4	1	1	Futrelle, Mrs. Jacques Heath (Lily May Peel)	female	35	1	0	113803	53.1000	C123	S	female	With family	yes
4	5	0	3	Allen, Mr. William Henry	male	35	0	0	373450	8.0500	NaN	S	male	Alone	no

Class Factor

In [570]:
```
# Survived vs. class Grouped by gender
sns.factorplot('Pclass','Survived', hue='person', data=titanic_df, order=range(1,4),
               hue_order = ['child','female','male'])
```

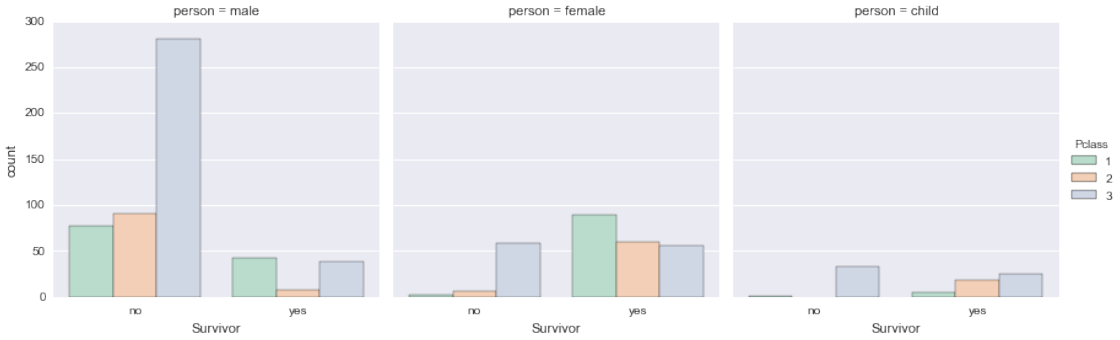
Out[570]:
```
<seaborn.axisgrid.FacetGrid at 0x92e0334c>
```



From the figure above, being a male or a third class reduce the chance for one to survive.

```
In [566]: sns.factorplot('Survivor', data=titanic_df, hue='Pclass', kind='count', palette='Pastel2', hu
                        col='person')
```

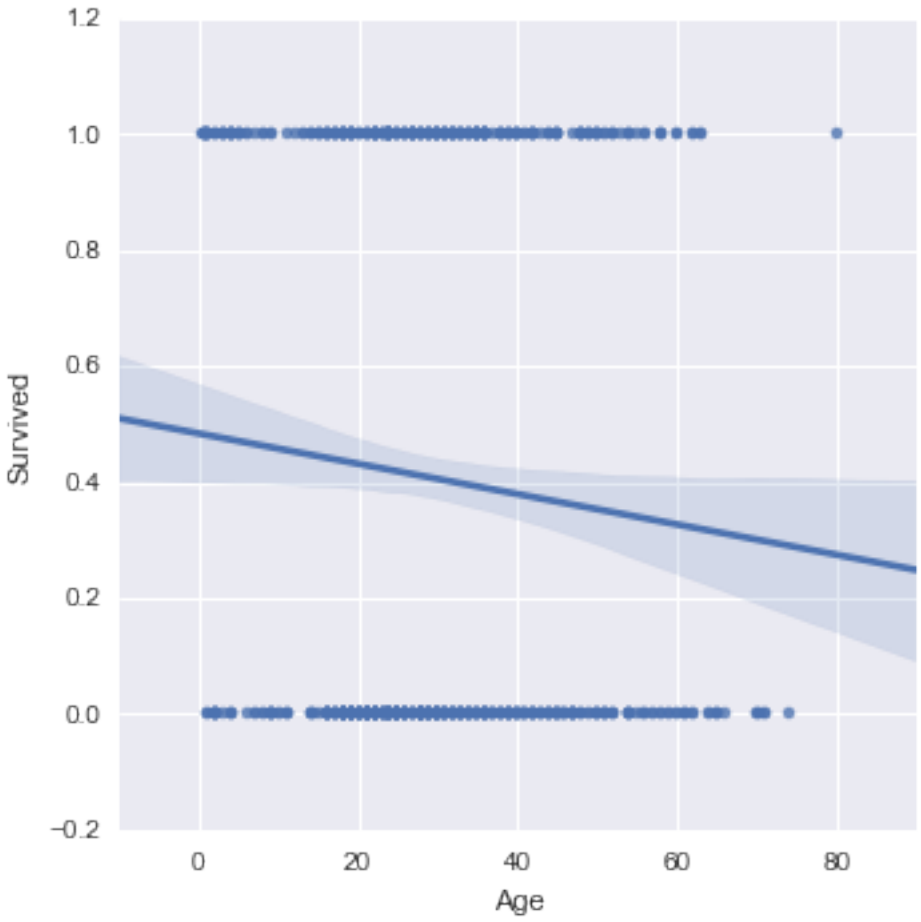
```
Out[566]: <seaborn.axisgrid.FacetGrid at 0x932f65cc>
```



0.3.3 Age Factor

```
In [571]: # Linear plot of age vs. survived
          sns.lmplot('Age', 'Survived', data=titanic_df)
```

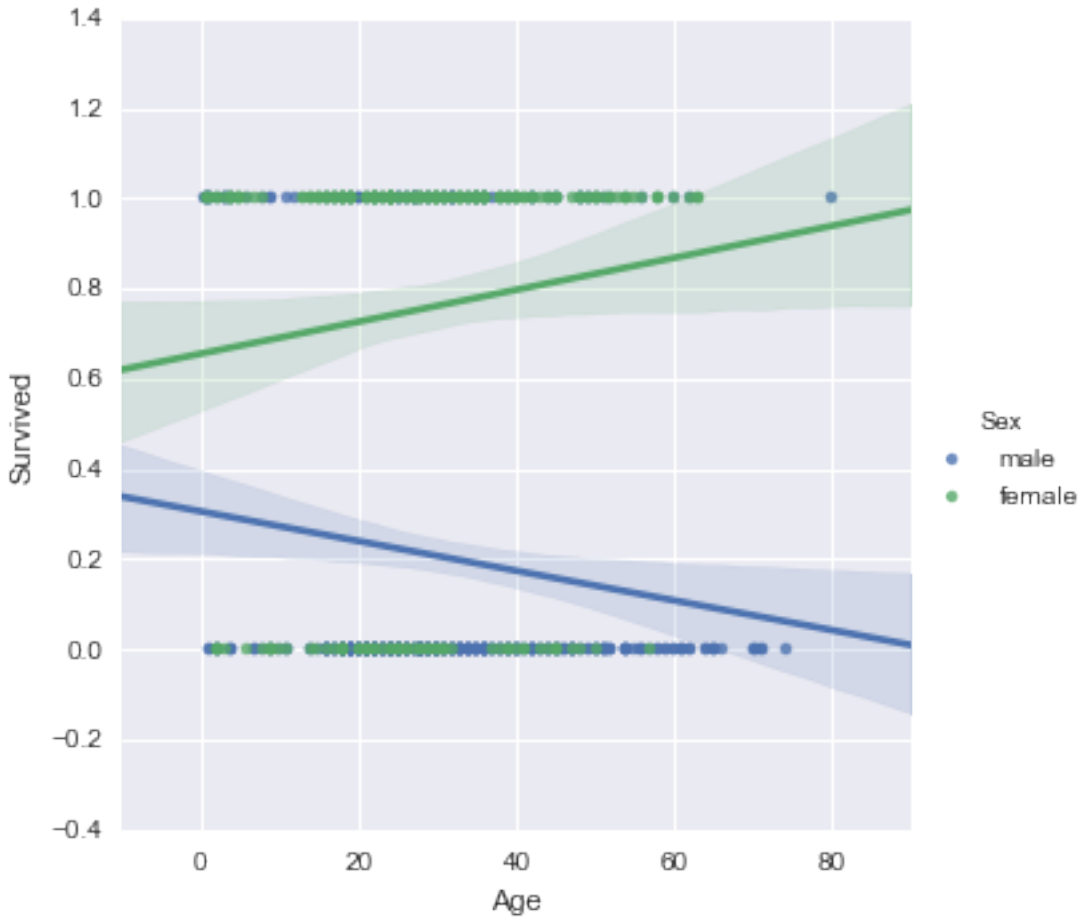
```
Out[571]: <seaborn.axisgrid.FacetGrid at 0x92e2904c>
```



There seems to be a general linear trend between age and the survived field. The plot shows that the older the passenger is, the less chance he/she would survive.

```
In [573]: # Survived vs. Age grouped by Sex
          sns.lmplot('Age', 'Survived', data=titanic_df, hue='Sex')
```

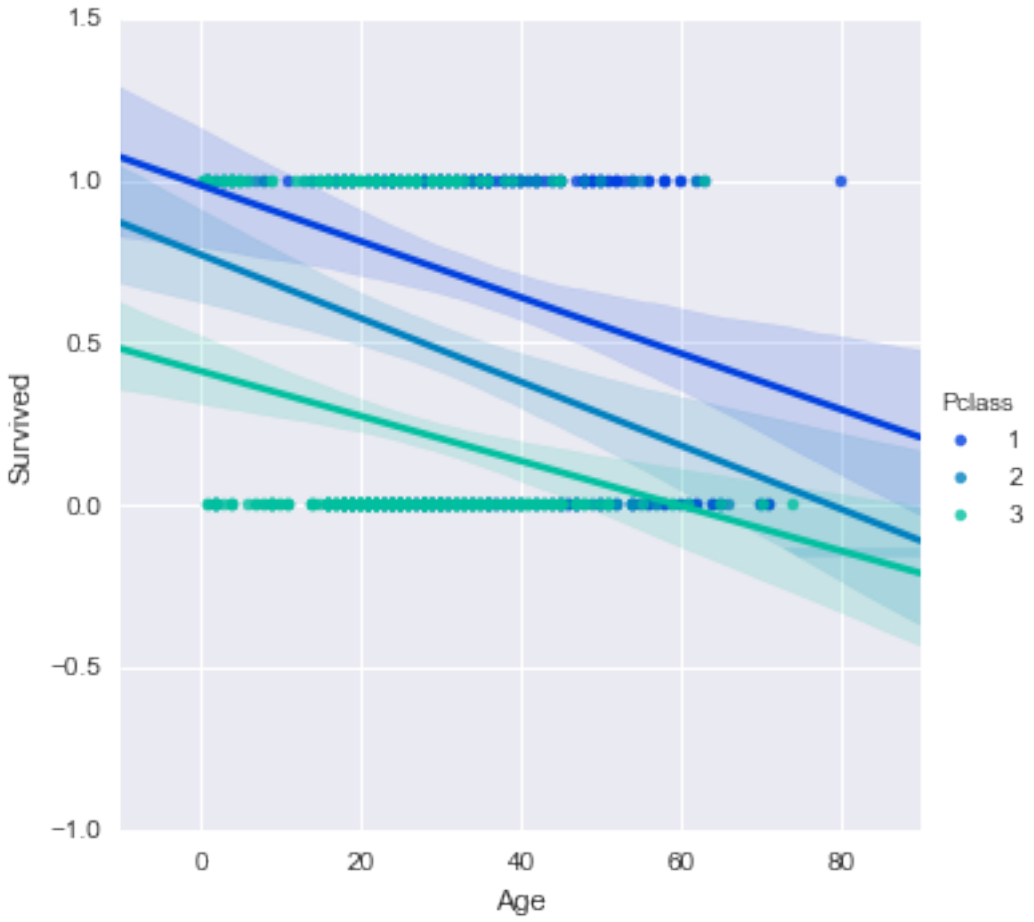
```
Out[573]: <seaborn.axisgrid.FacetGrid at 0x92d152cc>
```



Older women have higher rate of survival than older men as shown in the figure above. Also, older women has higher rate of srvival than younger women; an opposite trend to the one for the male passengers.

```
In [576]: # Survived vs. Age gruped by class
          sns.lmplot('Age', 'Survived', hue='Pclass', data=titanic_df, palette='winter', hue_order=rang
```

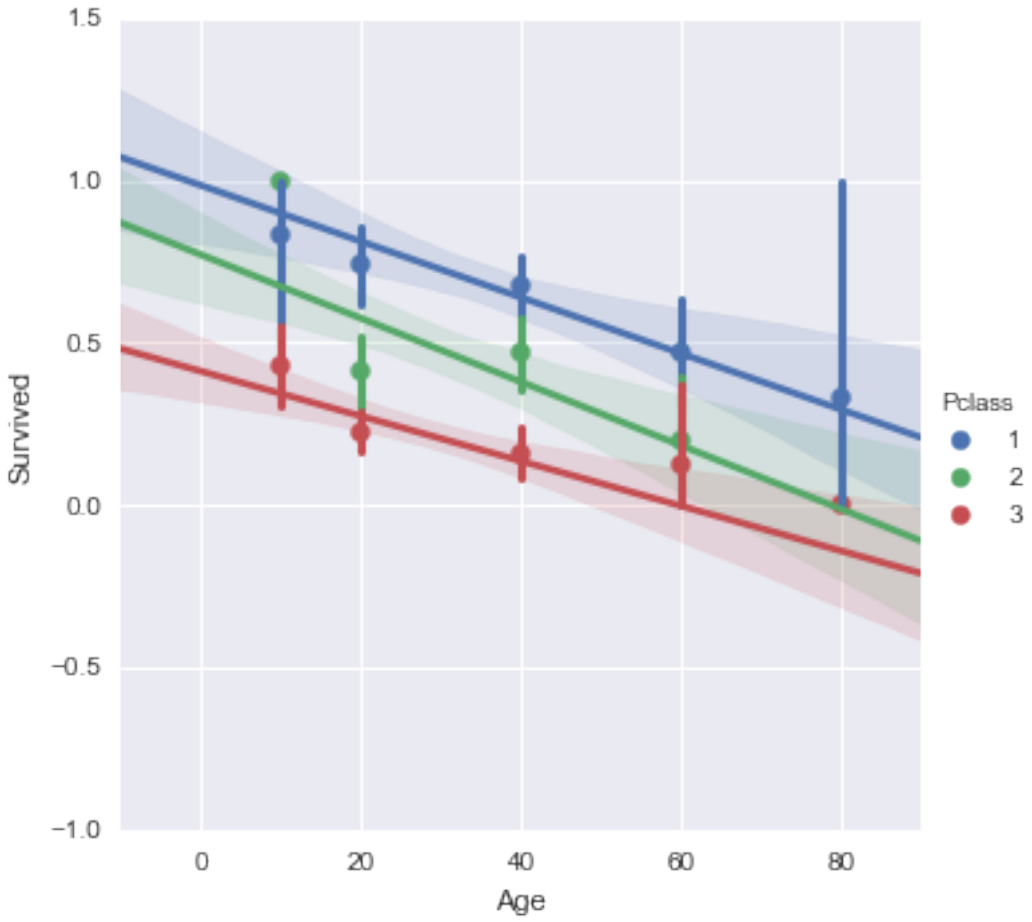
```
Out[576]: <seaborn.axisgrid.FacetGrid at 0x9265a06c>
```



In all three classes, the chance to survive reduced as the passengers got older.

```
In [578]: # Create a generation bin
          generations = [10,20,40,60,80]
          sns.lmplot('Age','Survived',hue='Pclass',data=titanic_df,x_bins=generations, hue_order=[1,2,3]
```

```
Out[578]: <seaborn.axisgrid.FacetGrid at 0x9231fcac>
```



Deck Factor

```
In [580]: titanic_df.columns

Out[580]: 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',
                 u'person', u'Alone', u'Survivor'],
                dtype='object')

In [606]: titanic_DF = titanic_df.dropna(subset=['Cabin'])

In [596]: d[0:10]

Out[596]: ['C', 'C', 'E', 'G', 'C', 'D', 'A', 'C', 'B', 'D']

In [607]: len(titanic_DF), len(d)

Out[607]: (204, 204)

In [608]: titanic_DF['Deck'] = d
```

```
/home/tarek/anaconda/lib/python2.7/site-packages/IPython/kernel/__main__.py:1: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the the caveats in the documentation: http://pandas.pydata.org/pandas-docs/stable/indexing.html#inde
  if __name__ == '__main__':
```

```
In [613]: titanic_DF = titanic_DF[titanic_DF.Deck != 'T']
```

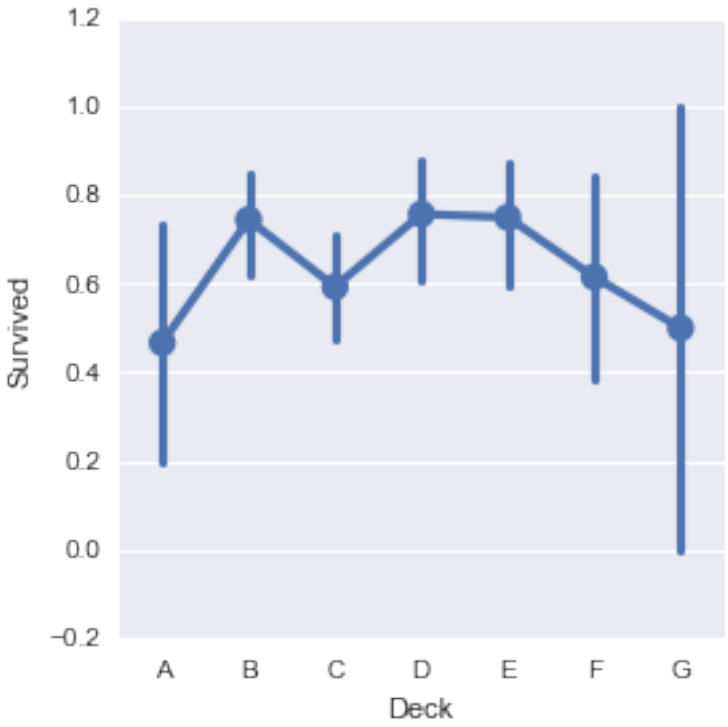
```
In [614]: titanic_DF.head()
```

Out[614]:

	PassengerId	Survived	Pclass	Name	Sex	Age	SibSp	Parch	Ticket	Fare	Cabin	Embarked	person	Alone	Survivor	Deck
1	2	1	1	Cumings, Mrs. John Bradley (Florence Briggs Th...	female	38	1	0	PC 17599	71.2833	C85	C	female	With family	yes	C
3	4	1	1	Futrelle, Mrs. Jacques Heath (Lily May Peel)	female	35	1	0	113803	53.1000	C123	S	female	With family	yes	C
6	7	0	1	McCarthy, Mr. Timothy J	male	54	0	0	17463	51.8625	E46	S	male	Alone	no	E
10	11	1	3	Sandstrom, Miss. Marguerite Rut	female	4	1	1	PP 9549	16.7000	G6	S	child	With family	yes	G
11	12	1	1	Bonnell, Miss. Elizabeth	female	58	0	0	113783	26.5500	C103	S	female	Alone	yes	C

```
In [616]: sns.factorplot('Deck', 'Survived', data=titanic_DF, order=['A','B','C','D','E','F','G'])
```

```
Out[616]: <seaborn.axisgrid.FacetGrid at 0x9270680c>
```

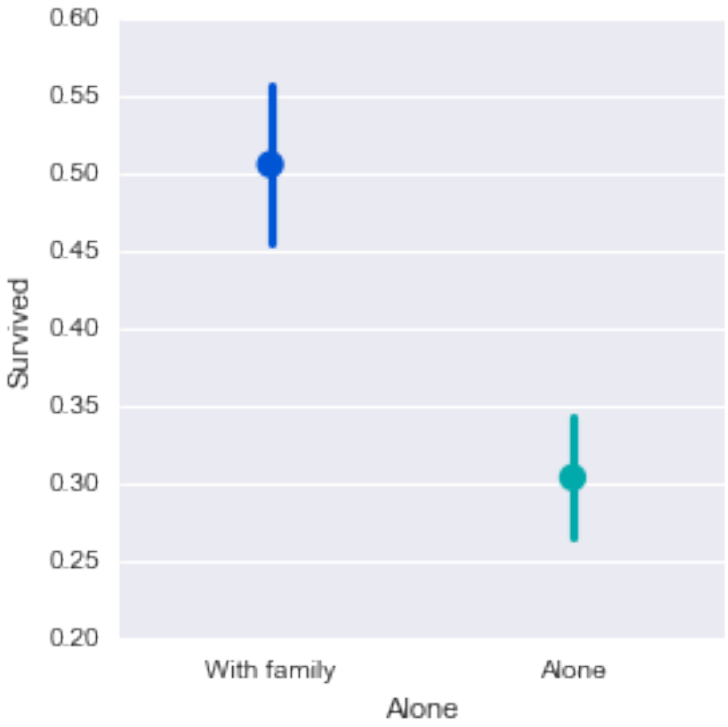


There does not seem to be any relation between deck and the survival rate as shown in the above figure!

Family Status Factor

```
In [621]: sns.factorplot('Alone', 'Survived', data=titanic_df, palette='winter') #hue='person',
                        #hue_order=['child', 'female', 'male'])
```

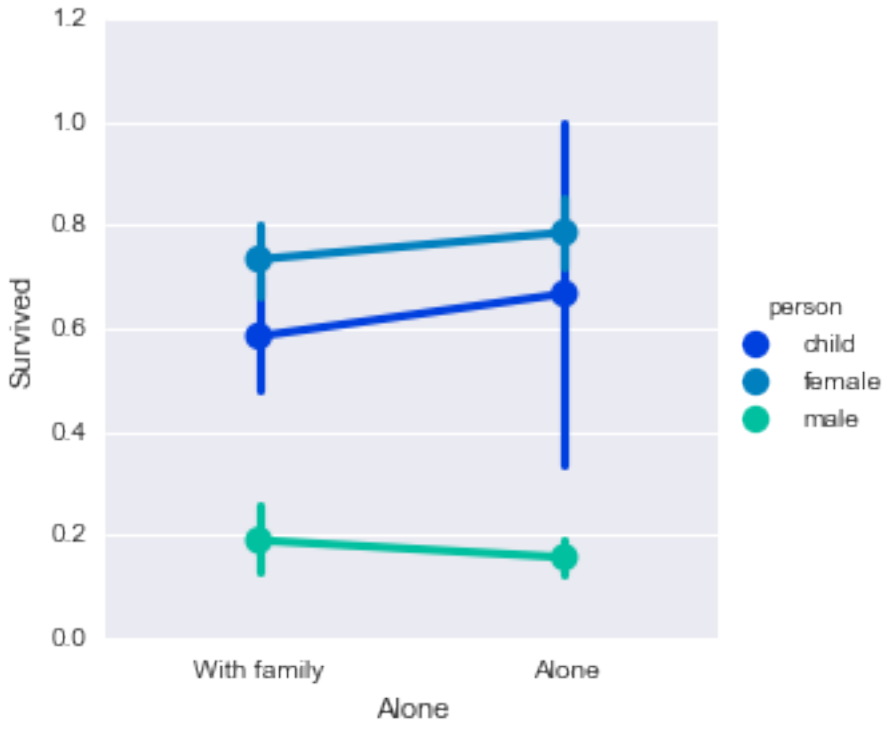
```
Out[621]: <seaborn.axisgrid.FacetGrid at 0x91c1cbac>
```



There seems that the survival rate diminishes significantly for those who were alone. However, lets check if a gender or age play a factor. From the figure below, one may conclude that the survival rate for women and children are much higher than that of men, as was concluded previously and as anticipated. However, the survival rate is not significant for either gender or for children who were with family versus who were alone. Moreover, the survival rate for women and children increases for those who were alone. For men, the survival rate diminishes slightly for those who were alone versus for those who were with family.

```
In [622]: sns.factorplot('Alone', 'Survived', data=titanic_df, palette='winter', hue='person',
                         hue_order=['child', 'female', 'male'])
```

```
Out[622]: <seaborn.axisgrid.FacetGrid at 0x91bf57cc>
```



In [626]:
```
# Lets split it by class now!
sns.factorplot('Alone', 'Survived', data=titanic_df, palette='summer', hue='person',
               hue_order=['child', 'female', 'male'], col='Pclass', col_order=[1,2,3])
```

Out[626]: <seaborn.axisgrid.FacetGrid at 0x915553ac>

0.3.4 Predictive Modeling

In [627]:
```
import sklearn
```

In [ ]: