matplotlib

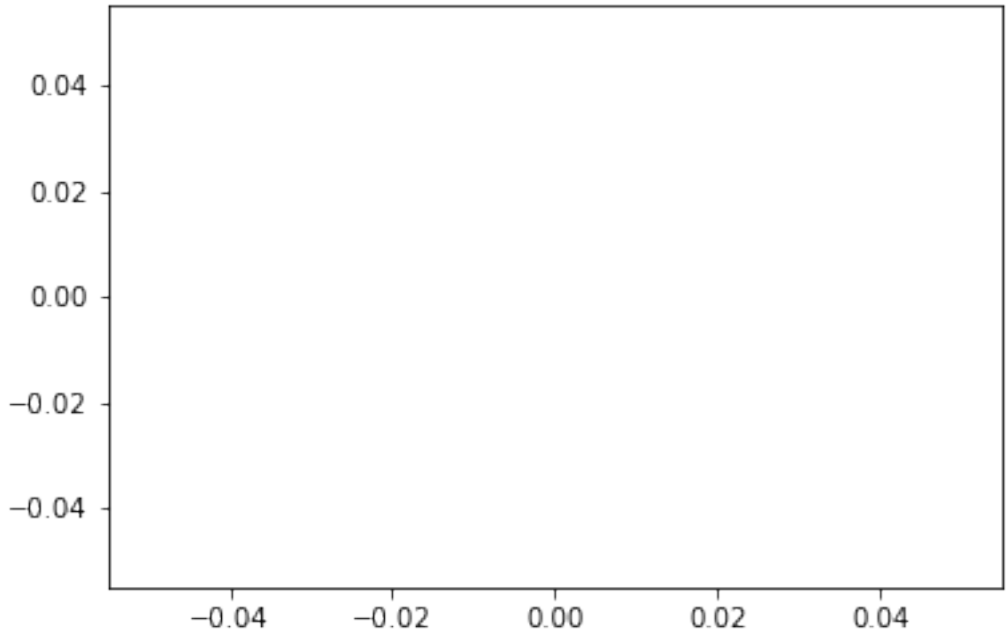
2018 年 2 月 8 日

1 画图

In [1]:
```
import pandas as pd
unrate = pd.read_csv('unrate.csv')
unrate['DATE'] = pd.to_datetime(unrate['DATE'])
print(unrate.head(12))
```

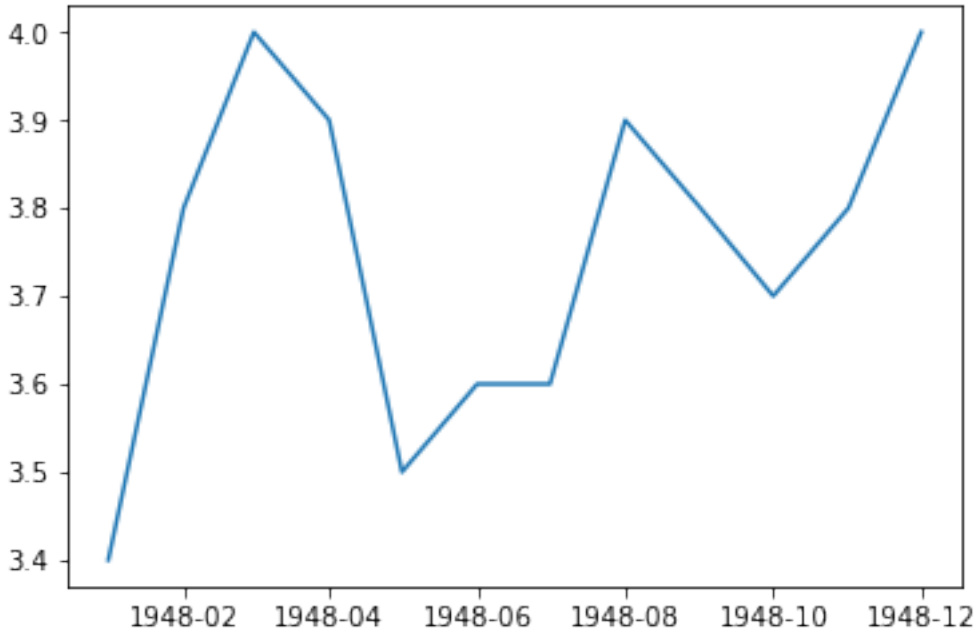
```
         DATE  VALUE
0  1948-01-01    3.4
1  1948-02-01    3.8
2  1948-03-01    4.0
3  1948-04-01    3.9
4  1948-05-01    3.5
5  1948-06-01    3.6
6  1948-07-01    3.6
7  1948-08-01    3.9
8  1948-09-01    3.8
9  1948-10-01    3.7
10 1948-11-01    3.8
11 1948-12-01    4.0
```

In [2]:
```
import matplotlib.pyplot as plt
#%matplotlib inline
#Using the different pyplot functions, we can create, customize, and display a plot. For e
plt.plot()
plt.show()
```



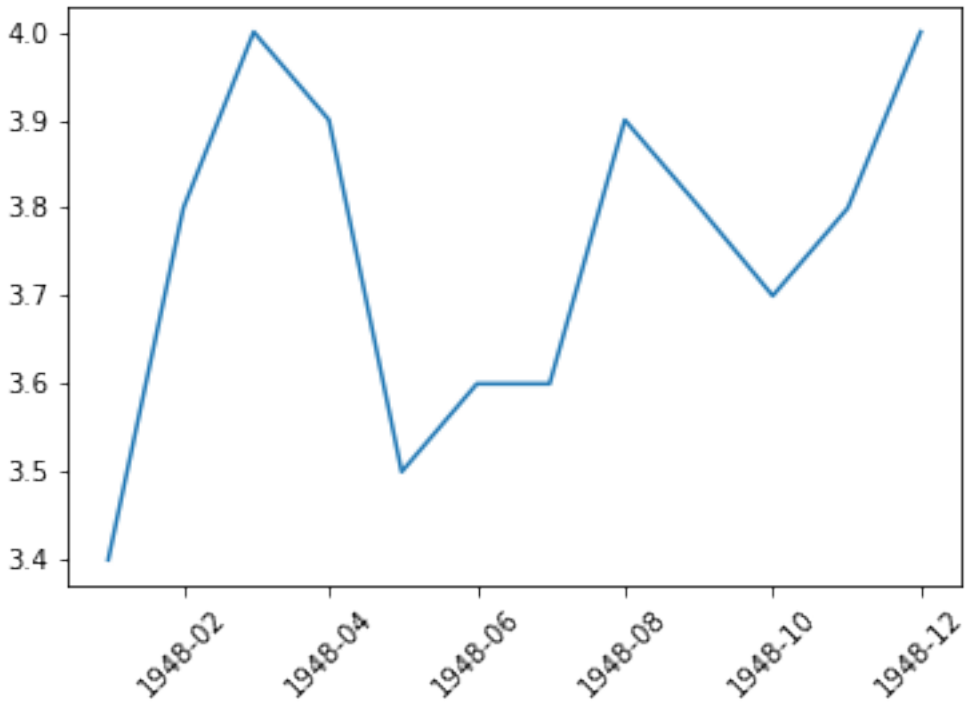
1.1 折线图

```
In [3]: first_twelve = unrate[0:12]
        plt.plot(first_twelve['DATE'], first_twelve['VALUE'])
        plt.show()
```



plt.xticks(rotation=45)

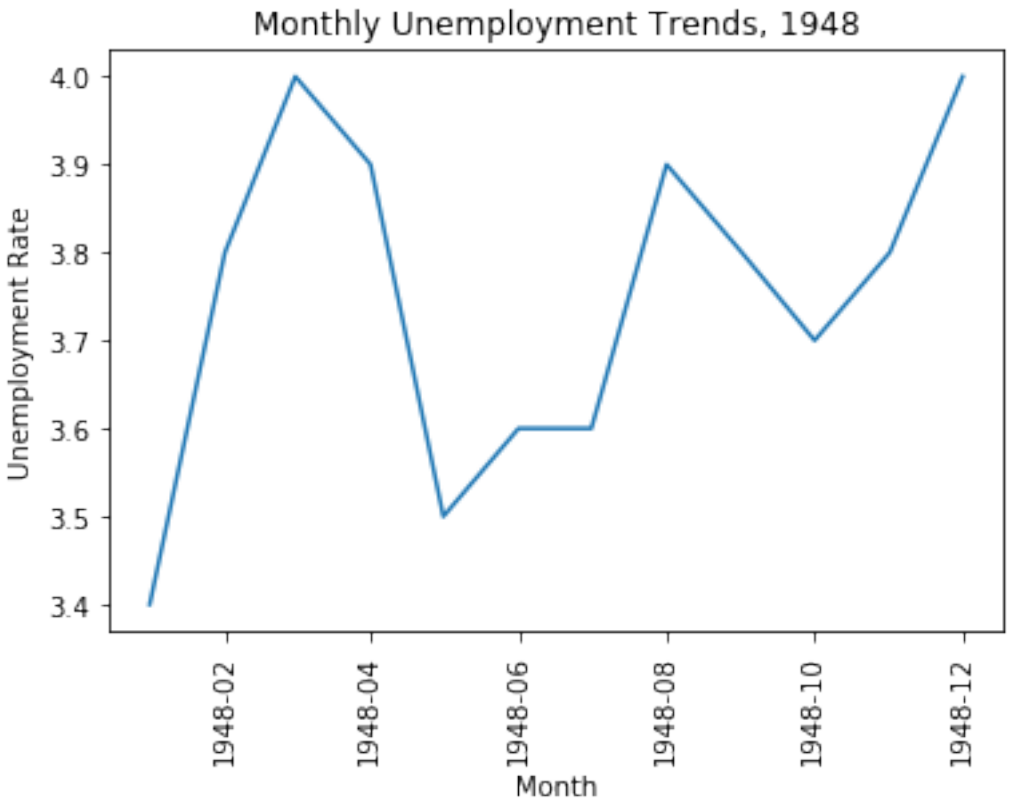
```
In [4]: #While the y-axis looks fine, the x-axis tick labels are too close together and are unread
        #We can rotate the x-axis tick labels by 90 degrees so they don't overlap
        #We can specify degrees of rotation using a float or integer value.
        plt.plot(first_twelve['DATE'], first_twelve['VALUE'])
        plt.xticks(rotation=45)
        #print help(plt.xticks)
        plt.show()
```



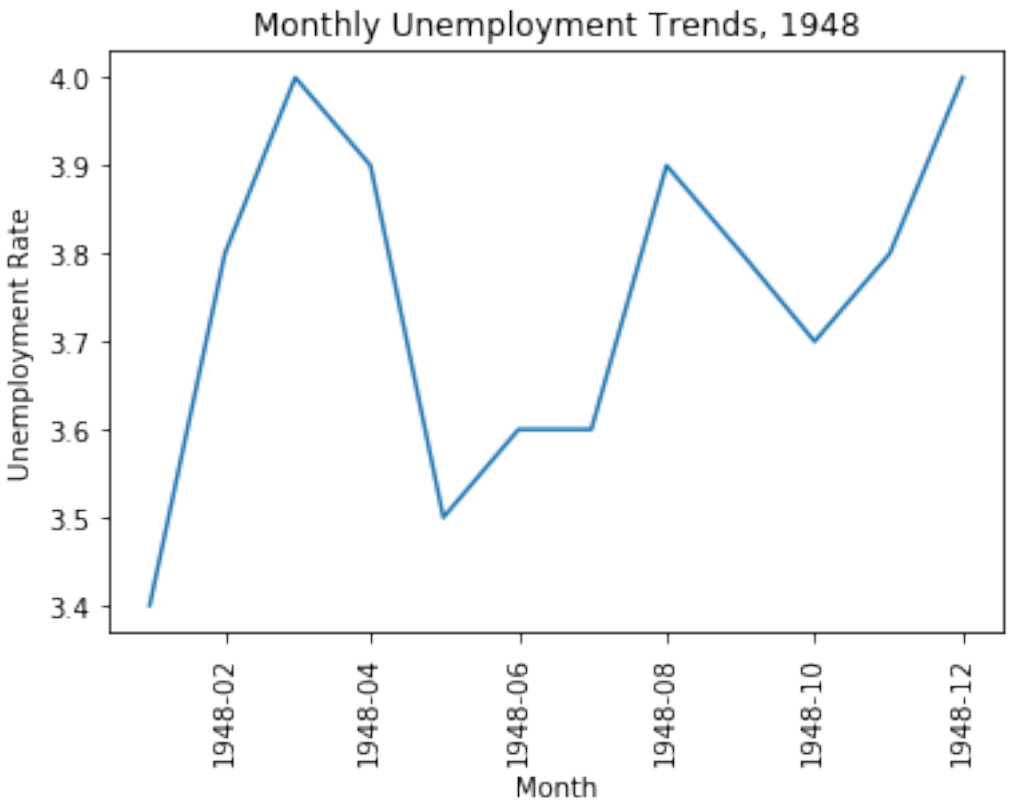
plt.xticks(rotation=90)
label

```
In [5]: #xlabel(): accepts a string value, which gets set as the x-axis label.
        #ylabel(): accepts a string value, which is set as the y-axis label.
        #title(): accepts a string value, which is set as the plot title.

        plt.plot(first_twelve['DATE'], first_twelve['VALUE'])
        plt.xticks(rotation=90)
```

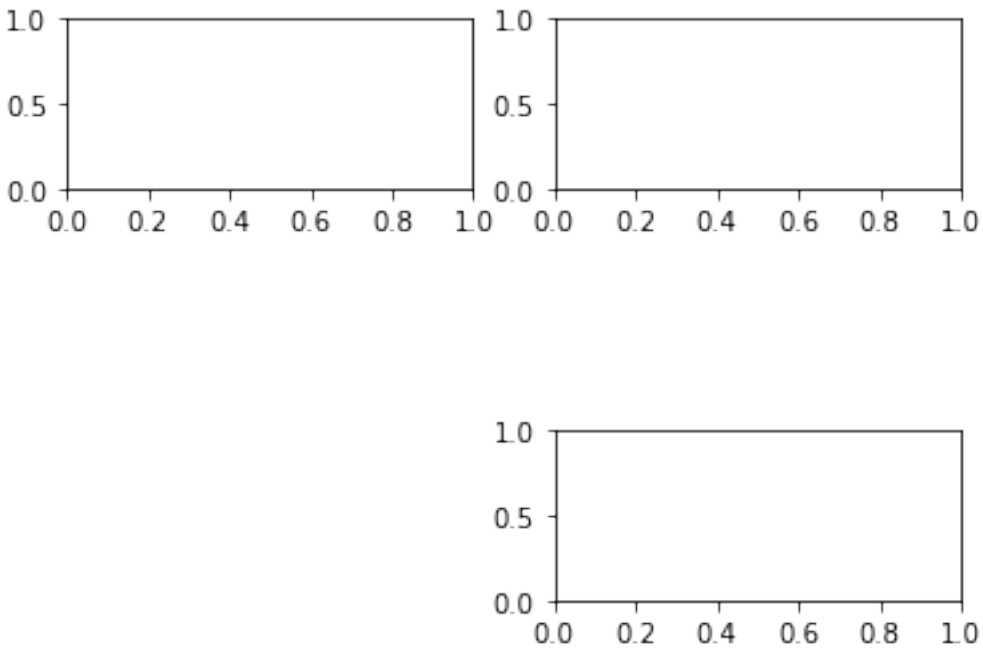
```
plt.xlabel('Month')
plt.ylabel('Unemployment Rate')
plt.title('Monthly Unemployment Trends, 1948')
plt.show()
```



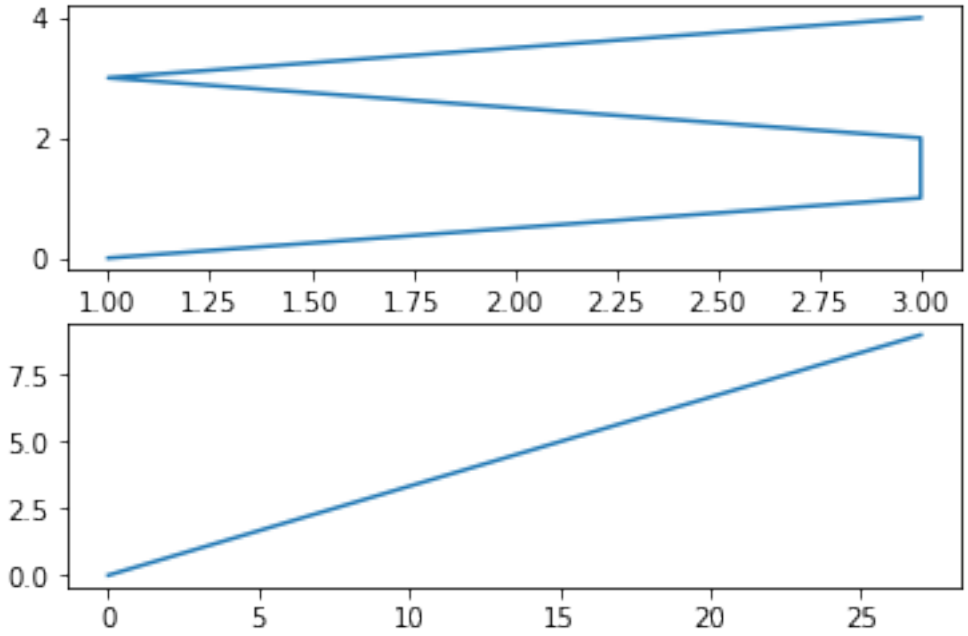
In [6]:
```
import pandas as pd
import matplotlib.pyplot as plt

unrate = pd.read_csv('unrate.csv')
unrate['DATE'] = pd.to_datetime(unrate['DATE'])
first_twelve = unrate[0:12]
plt.plot(first_twelve['DATE'], first_twelve['VALUE'])
plt.xticks(rotation=90)
plt.xlabel('Month')
plt.ylabel('Unemployment Rate')
plt.title('Monthly Unemployment Trends, 1948')
plt.show()
```



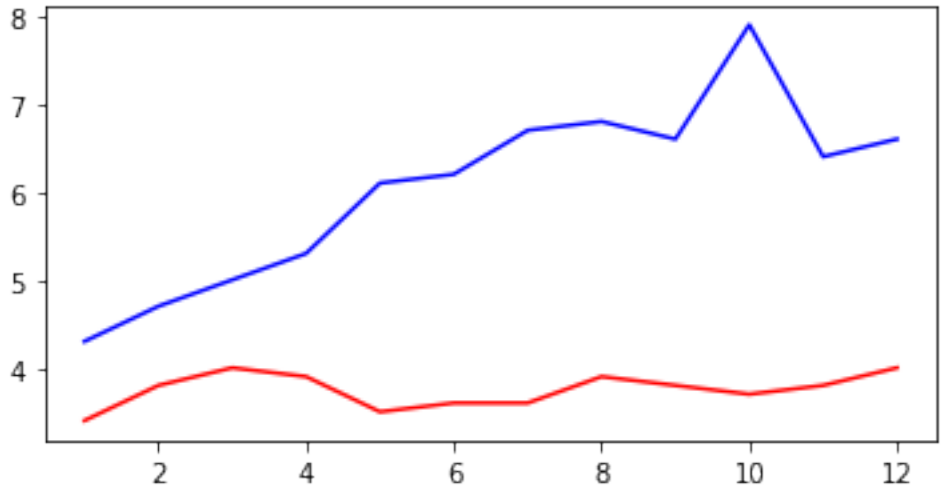
In [7]:
```
#add_subplot(first,second,index) first means number of Row,second means number of Column.

import matplotlib.pyplot as plt
fig = plt.figure()
ax1 = fig.add_subplot(3,2,1)
ax2 = fig.add_subplot(3,2,2)
ax2 = fig.add_subplot(3,2,6)
plt.show()
```



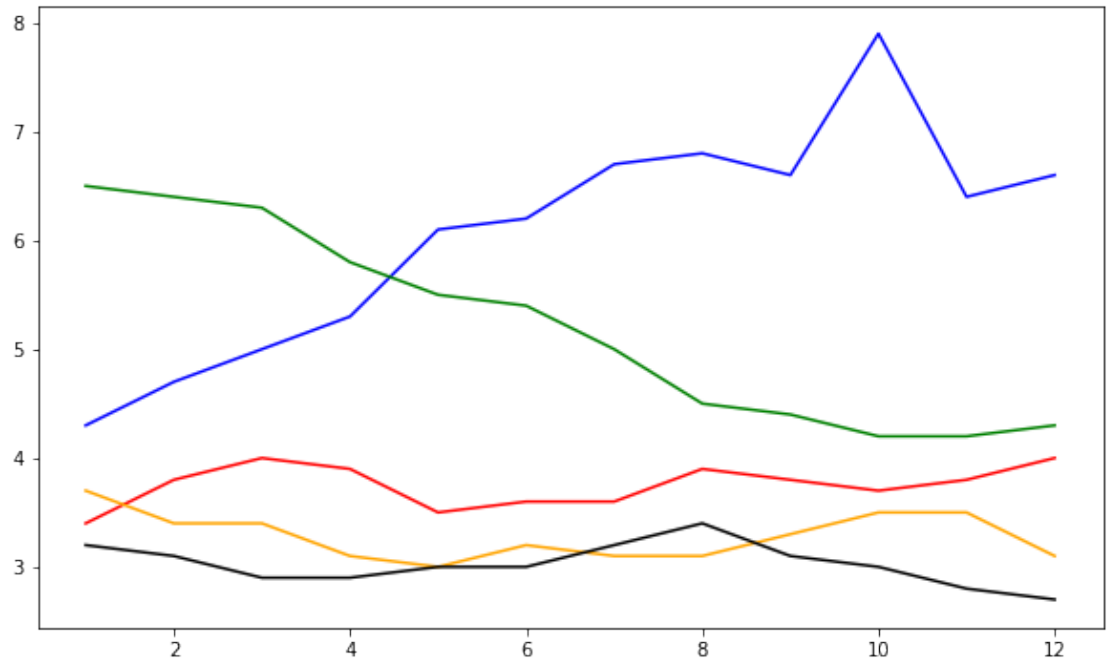
In [8]:
```
import numpy as np
fig = plt.figure()
#fig = plt.figure(figsize=(3, 3))
ax1 = fig.add_subplot(2,1,1)
ax2 = fig.add_subplot(2,1,2)

ax1.plot(np.random.randint(1,5,5), np.arange(5))
ax2.plot(np.arange(10)*3, np.arange(10))
plt.show()
```



In [9]:
```
unrate['MONTH'] = unrate['DATE'].dt.month
unrate['MONTH'] = unrate['DATE'].dt.month
fig = plt.figure(figsize=(6,3))

plt.plot(unrate[0:12]['MONTH'], unrate[0:12]['VALUE'], c='red')
plt.plot(unrate[12:24]['MONTH'], unrate[12:24]['VALUE'], c='blue')

plt.show()
```

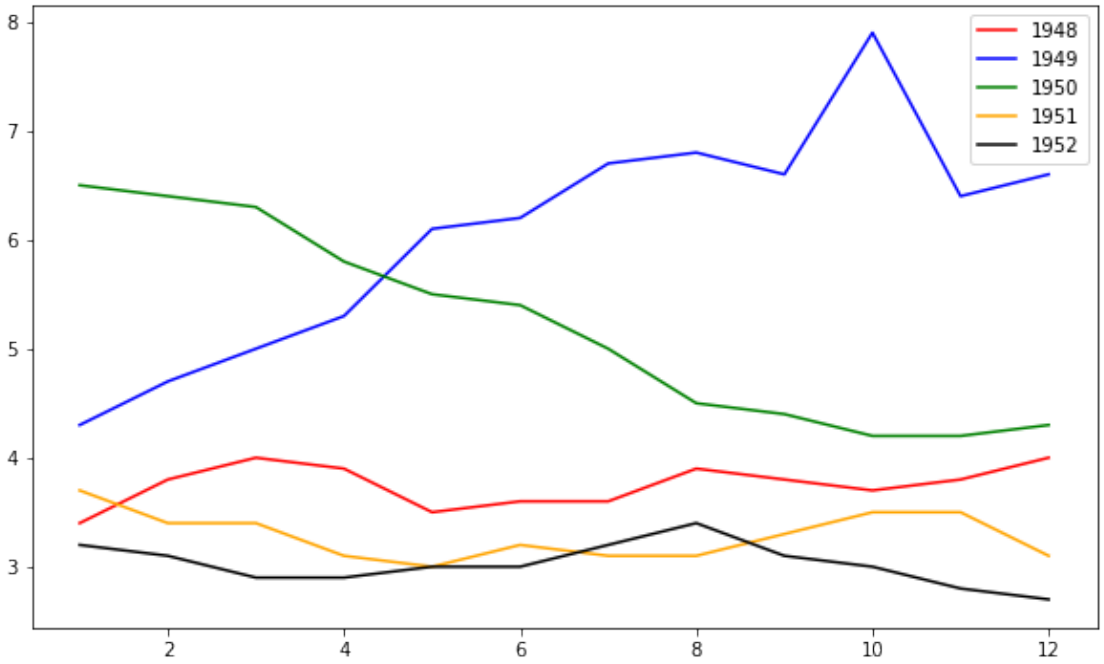


In [10]:
```
fig = plt.figure(figsize=(10,6))
colors = ['red', 'blue', 'green', 'orange', 'black']
for i in range(5):
    start_index = i*12
    end_index = (i+1)*12
    subset = unrate[start_index:end_index]
    plt.plot(subset['MONTH'], subset['VALUE'], c=colors[i])

plt.show()
```

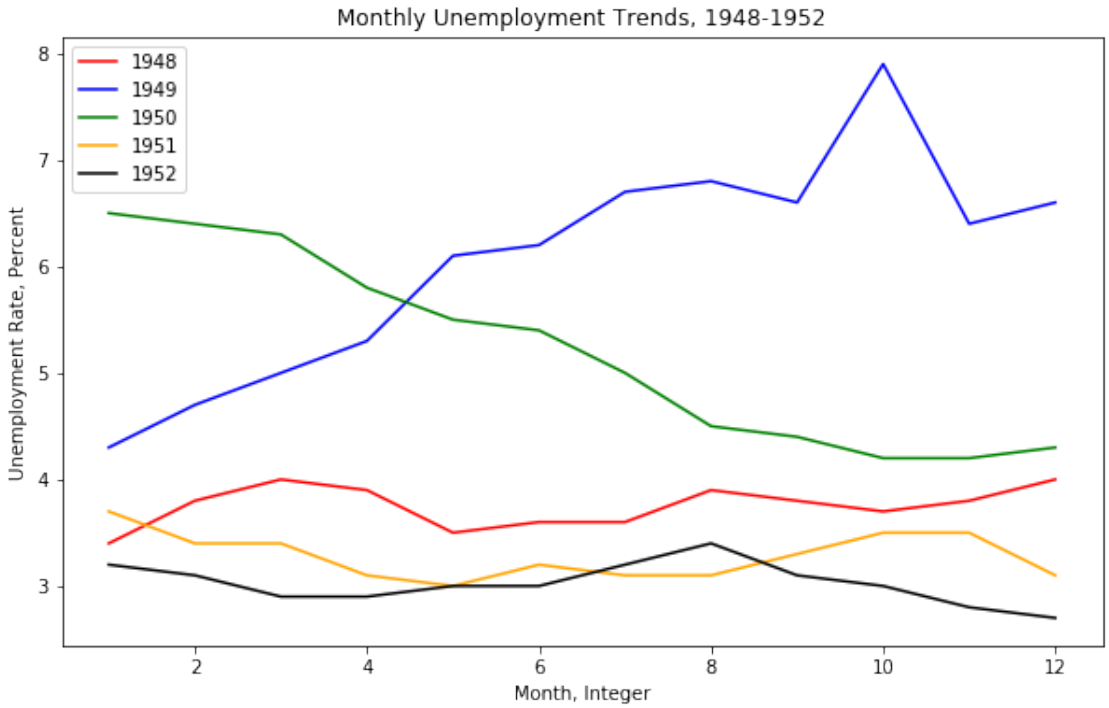


In [11]:
```
fig = plt.figure(figsize=(10,6))
colors = ['red', 'blue', 'green', 'orange', 'black']
for i in range(5):
    start_index = i*12
    end_index = (i+1)*12
    subset = unrate[start_index:end_index]
    label = str(1948 + i)
    plt.plot(subset['MONTH'], subset['VALUE'], c=colors[i], label=label)
plt.legend(loc='best')
```

```
#print help(plt.legend)
plt.show()
```



In [12]:
```
fig = plt.figure(figsize=(10,6))
colors = ['red', 'blue', 'green', 'orange', 'black']
for i in range(5):
    start_index = i*12
    end_index = (i+1)*12
    subset = unrate[start_index:end_index]
    label = str(1948 + i)
    plt.plot(subset['MONTH'], subset['VALUE'], c=colors[i], label=label)
plt.legend(loc='upper left')
plt.xlabel('Month, Integer')
plt.ylabel('Unemployment Rate, Percent')
plt.title('Monthly Unemployment Trends, 1948-1952')

plt.show()
```




```
In [13]: import pandas as pd
         reviews = pd.read_csv('fandango_scores.csv')
         cols = ['FILM', 'RT_user_norm', 'Metacritic_user_nom', 'IMDB_norm', 'Fandango_Ratingvalue
         norm_reviews = reviews[cols]
         print(norm_reviews[:1])
```

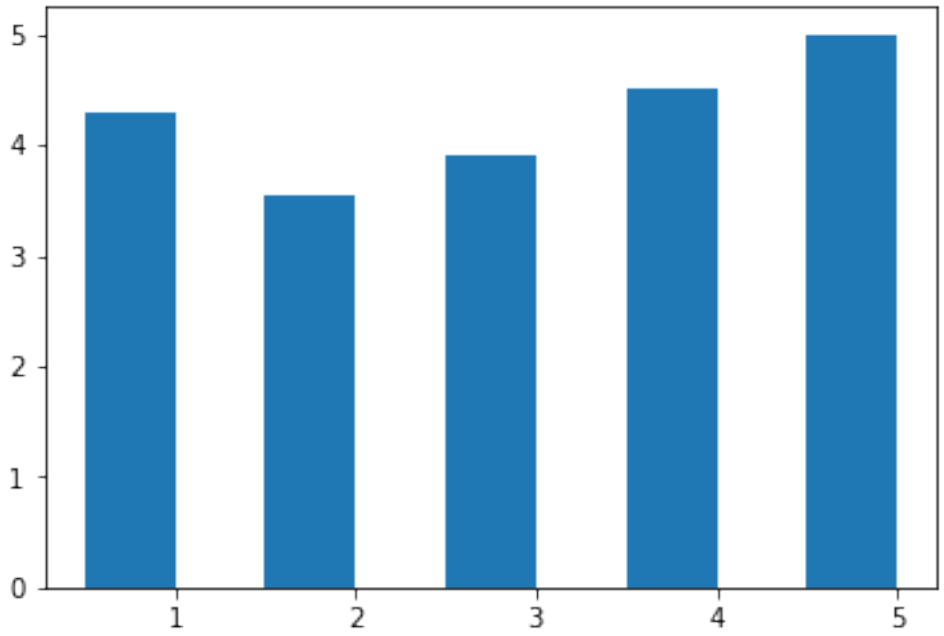
```
                            FILM  RT_user_norm  Metacritic_user_nom  \
0  Avengers: Age of Ultron (2015)           4.3                 3.55

   IMDB_norm  Fandango_Ratingvalue  Fandango_Stars
0        3.9                   4.5             5.0
```

1.2 条形图

```
In [14]: import matplotlib.pyplot as plt
         from numpy import arange
         #The Axes.bar() method has 2 required parameters, left and height.
         #We use the left parameter to specify the x coordinates of the left sides of the bar.
         #We use the height parameter to specify the height of each bar
         num_cols = ['RT_user_norm', 'Metacritic_user_nom', 'IMDB_norm', 'Fandango_Ratingvalue', '
```

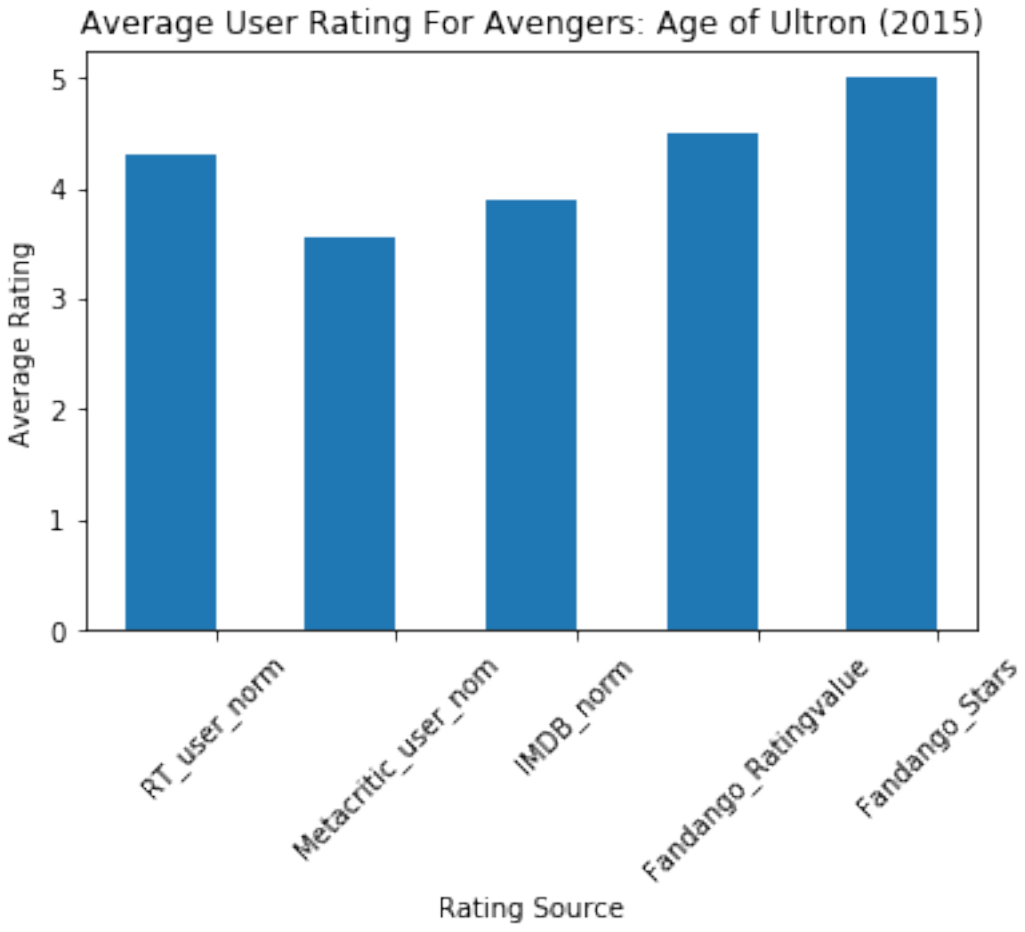
```
bar_heights = norm_reviews.ix[0, num_cols].values
#print bar_heights
bar_positions = arange(5) + 0.75
#print bar_positions
fig, ax = plt.subplots()
ax.bar(bar_positions, bar_heights, 0.5)
plt.show()
```

```
D:\Anaconda3\lib\site-packages\ipykernel_launcher.py:8: DeprecationWarning:
.ix is deprecated. Please use
.loc for label based indexing or
.iloc for positional indexing

See the documentation here:
http://pandas.pydata.org/pandas-docs/stable/indexing.html#deprecate_ix
```



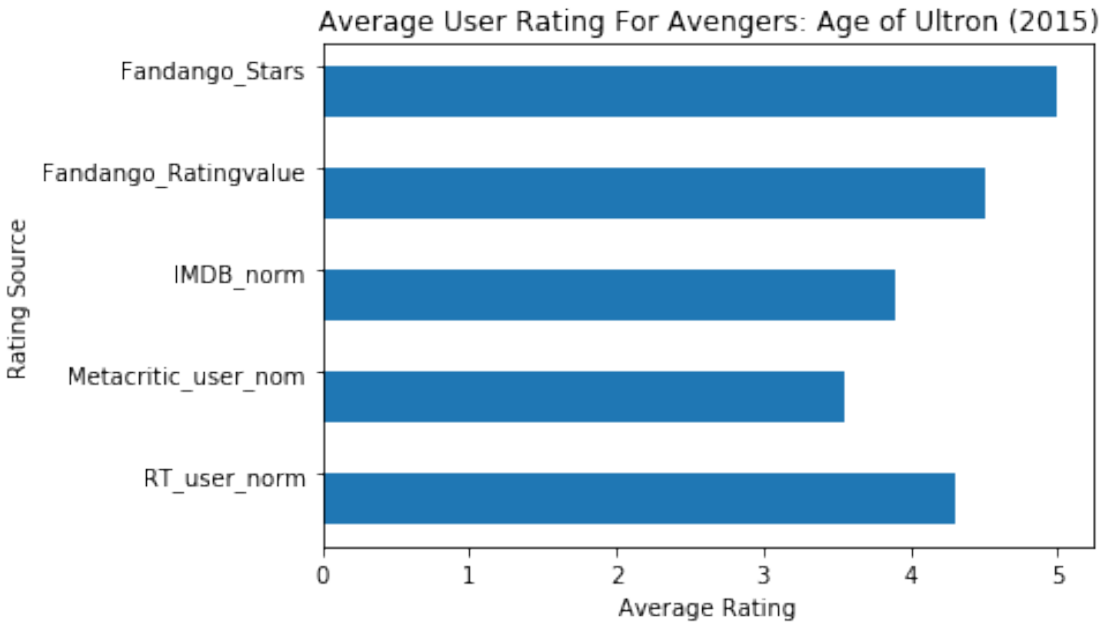
In [15]:
```
#By default, matplotlib sets the x-axis tick labels to the integer values the bars
#spanned on the x-axis (from 0 to 6). We only need tick labels on the x-axis where the ba
#We can use Axes.set_xticks() to change the positions of the ticks to [1, 2, 3, 4, 5]:
```

```
num_cols = ['RT_user_norm', 'Metacritic_user_nom', 'IMDB_norm', 'Fandango_Ratingvalue', '
bar_heights = norm_reviews.ix[0, num_cols].values
bar_positions = arange(5) + 0.75
tick_positions = range(1,6)
fig, ax = plt.subplots()
#bar_heights
ax.bar(bar_positions, bar_heights, 0.5)
ax.set_xticks(tick_positions)
ax.set_xticklabels(num_cols, rotation=45)

ax.set_xlabel('Rating Source')
ax.set_ylabel('Average Rating')
ax.set_title('Average User Rating For Avengers: Age of Ultron (2015)')
plt.show()
```



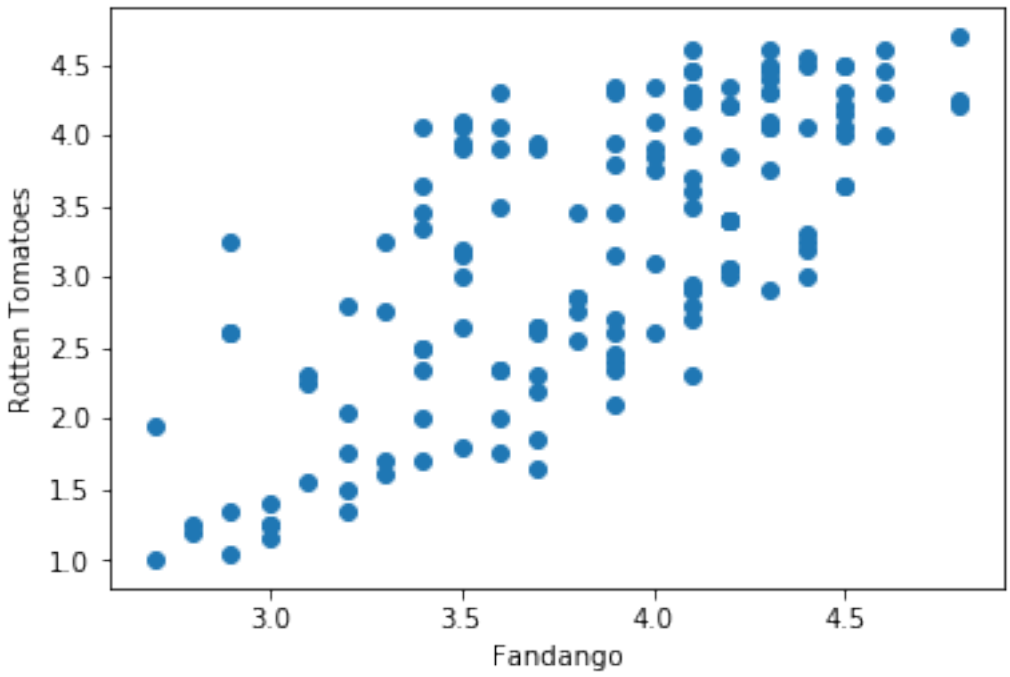
bar_widths 横向条形图

```
In [16]: import matplotlib.pyplot as plt
         from numpy import arange
         num_cols = ['RT_user_norm', 'Metacritic_user_nom', 'IMDB_norm', 'Fandango_Ratingvalue', '

         bar_widths = norm_reviews.ix[0, num_cols].values
         bar_positions = arange(5) + 0.75
         tick_positions = range(1,6)
         fig, ax = plt.subplots()

         ax.barh(bar_positions, bar_widths, 0.5)

         ax.set_yticks(tick_positions)
         ax.set_yticklabels(num_cols)
         ax.set_ylabel('Rating Source')
         ax.set_xlabel('Average Rating')
         ax.set_title('Average User Rating For Avengers: Age of Ultron (2015)')
         plt.show()
```

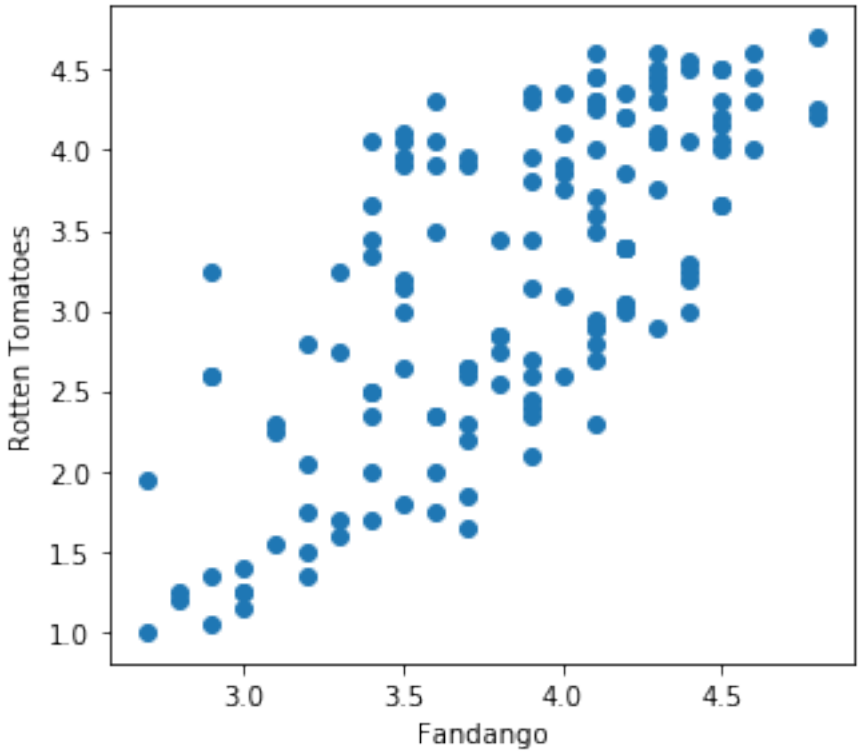


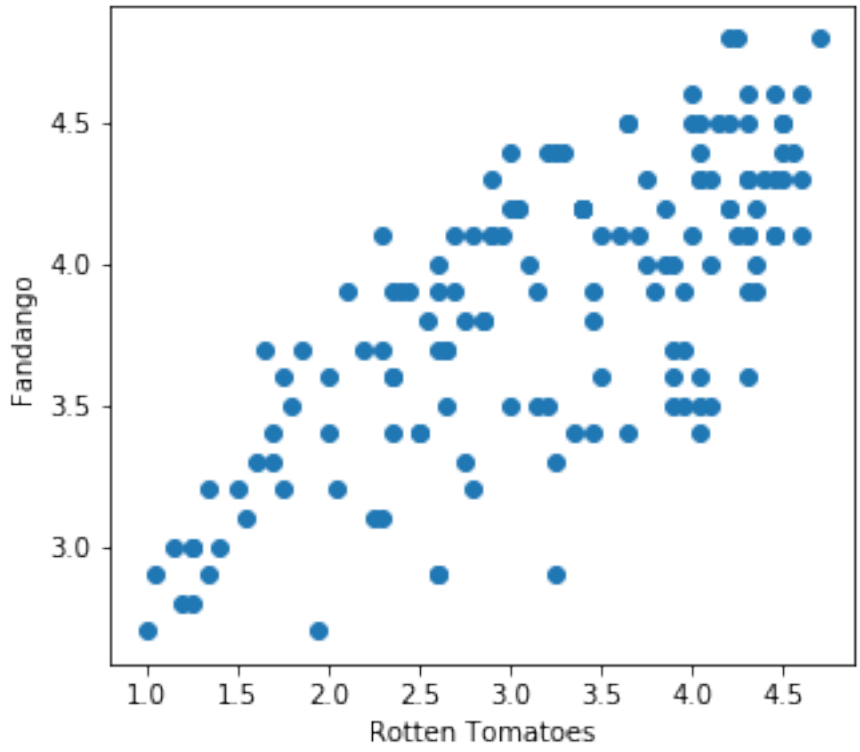
1.3 散点图

In [17]:
```
#Let's look at a plot that can help us visualize many points.
#scatter
fig, ax = plt.subplots()
ax.scatter(norm_reviews['Fandango_Ratingvalue'], norm_reviews['RT_user_norm'])
ax.set_xlabel('Fandango')
ax.set_ylabel('Rotten Tomatoes')
plt.show()
```



In [18]:
```
#Switching Axes
fig = plt.figure(figsize=(5,10))
ax1 = fig.add_subplot(2,1,1)
ax2 = fig.add_subplot(2,1,2)
ax1.scatter(norm_reviews['Fandango_Ratingvalue'], norm_reviews['RT_user_norm'])
ax1.set_xlabel('Fandango')
ax1.set_ylabel('Rotten Tomatoes')
ax2.scatter(norm_reviews['RT_user_norm'], norm_reviews['Fandango_Ratingvalue'])
ax2.set_xlabel('Rotten Tomatoes')
ax2.set_ylabel('Fandango')
plt.show()
```


Rotten Tomatoes
Fandango
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
3.0
3.5
4.0
4.5


Fandango
Rotten Tomatoes
4.5
4.0
3.5
3.0
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5

```
In [19]: import pandas as pd
         import matplotlib.pyplot as plt
         reviews = pd.read_csv('fandango_scores.csv')
         cols = ['FILM', 'RT_user_norm', 'Metacritic_user_nom', 'IMDB_norm', 'Fandango_Ratingvalue
         norm_reviews = reviews[cols]
         print(norm_reviews[:5])
```

```
                           FILM  RT_user_norm  Metacritic_user_nom  \
0  Avengers: Age of Ultron (2015)           4.3                 3.55
1               Cinderella (2015)           4.0                 3.75
2                  Ant-Man (2015)           4.5                 4.05
3          Do You Believe? (2015)           4.2                 2.35
4   Hot Tub Time Machine 2 (2015)           1.4                 1.70

   IMDB_norm  Fandango_Ratingvalue
0       3.90                   4.5
1       3.55                   4.5
2       3.90                   4.5
3       2.70                   4.5
4       2.55                   3.0
```

```
In [20]: fandango_distribution = norm_reviews['Fandango_Ratingvalue'].value_counts()
         fandango_distribution = fandango_distribution.sort_index()

         imdb_distribution = norm_reviews['IMDB_norm'].value_counts()
         imdb_distribution = imdb_distribution.sort_index()

         print(fandango_distribution)
         print(imdb_distribution)
```

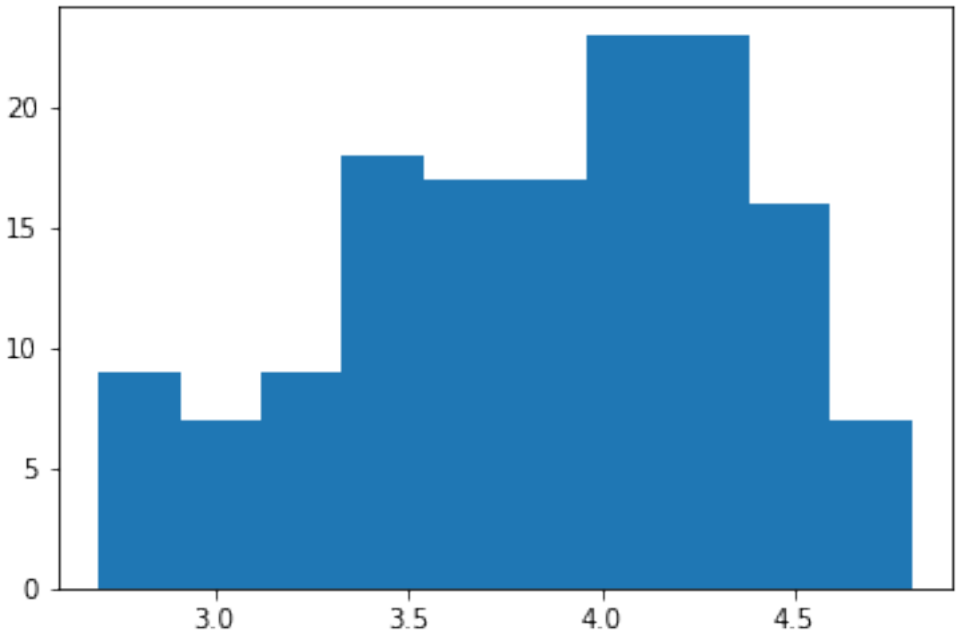
```
2.7     2
2.8     2
2.9     5
3.0     4
3.1     3
3.2     5
3.3     4
3.4     9
3.5     9
3.6     8
```

```
3.7     9
3.8     5
3.9    12
4.0     7
4.1    16
4.2    12
4.3    11
4.4     7
4.5     9
4.6     4
4.8     3
Name: Fandango_Ratingvalue, dtype: int64
2.00     1
2.10     1
2.15     1
2.20     1
2.30     2
2.45     2
2.50     1
2.55     1
2.60     2
2.70     4
2.75     5
2.80     2
2.85     1
2.90     1
2.95     3
3.00     2
3.05     4
3.10     1
3.15     9
3.20     6
3.25     4
3.30     9
3.35     7
3.40     1
3.45     7
3.50     4
3.55     7
```

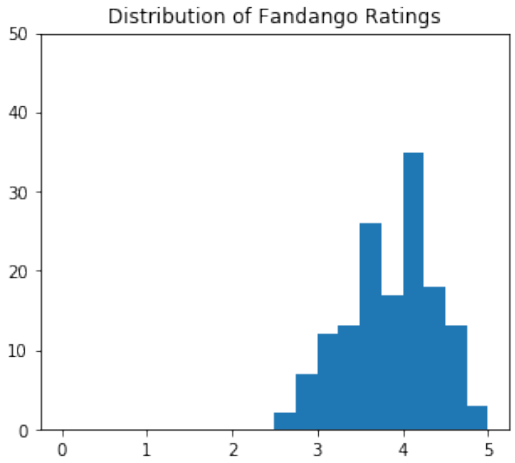
```
3.60    10
3.65     5
3.70     8
3.75     6
3.80     3
3.85     4
3.90     9
3.95     2
4.00     1
4.05     1
4.10     4
4.15     1
4.20     2
4.30     1
Name: IMDB_norm, dtype: int64
```

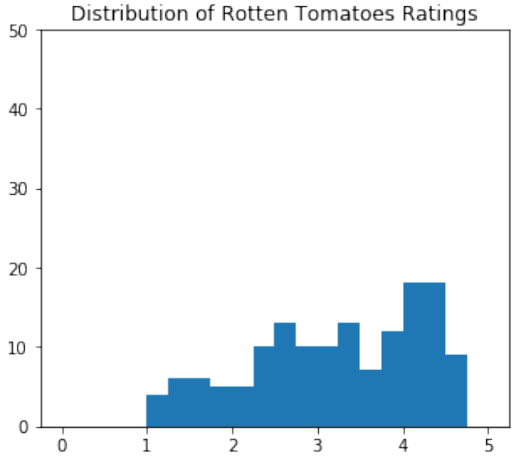
1.4 柱形图

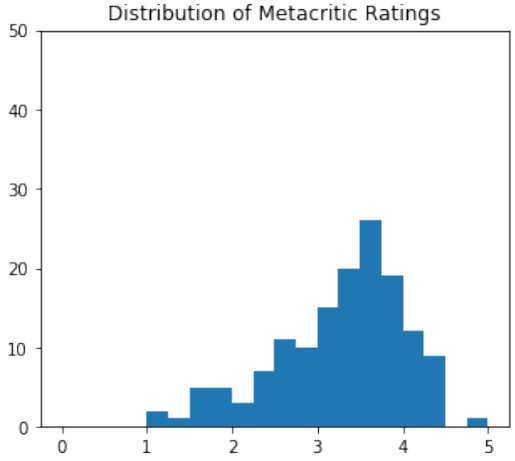
```
In [21]: fig, ax = plt.subplots()
         ax.hist(norm_reviews['Fandango_Ratingvalue'])
         #ax.hist(norm_reviews['Fandango_Ratingvalue'],bins=20)
         #ax.hist(norm_reviews['Fandango_Ratingvalue'], range=(4, 5),bins=20)
         plt.show()
```

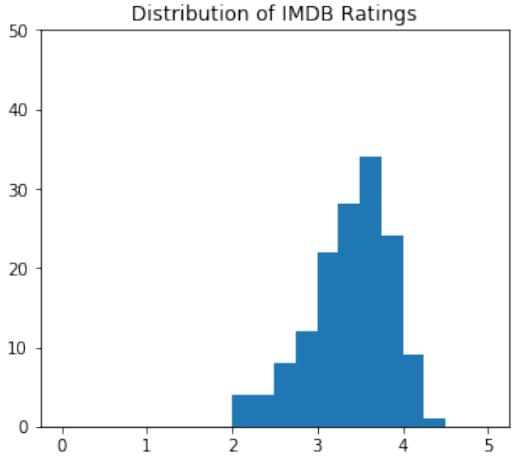


In [22]:
```
fig = plt.figure(figsize=(5,20))
ax1 = fig.add_subplot(4,1,1)
ax2 = fig.add_subplot(4,1,2)
ax3 = fig.add_subplot(4,1,3)
ax4 = fig.add_subplot(4,1,4)
ax1.hist(norm_reviews['Fandango_Ratingvalue'], bins=20, range=(0, 5))
ax1.set_title('Distribution of Fandango Ratings')
ax1.set_ylim(0, 50)

ax2.hist(norm_reviews['RT_user_norm'], 20, range=(0, 5))
ax2.set_title('Distribution of Rotten Tomatoes Ratings')
ax2.set_ylim(0, 50)

ax3.hist(norm_reviews['Metacritic_user_nom'], 20, range=(0, 5))
ax3.set_title('Distribution of Metacritic Ratings')
ax3.set_ylim(0, 50)

ax4.hist(norm_reviews['IMDB_norm'], 20, range=(0, 5))
ax4.set_title('Distribution of IMDB Ratings')
ax4.set_ylim(0, 50)

plt.show()
```


Distribution of Fandango Ratings
50
40
30
20
10
0
0
1
2
3
4
5

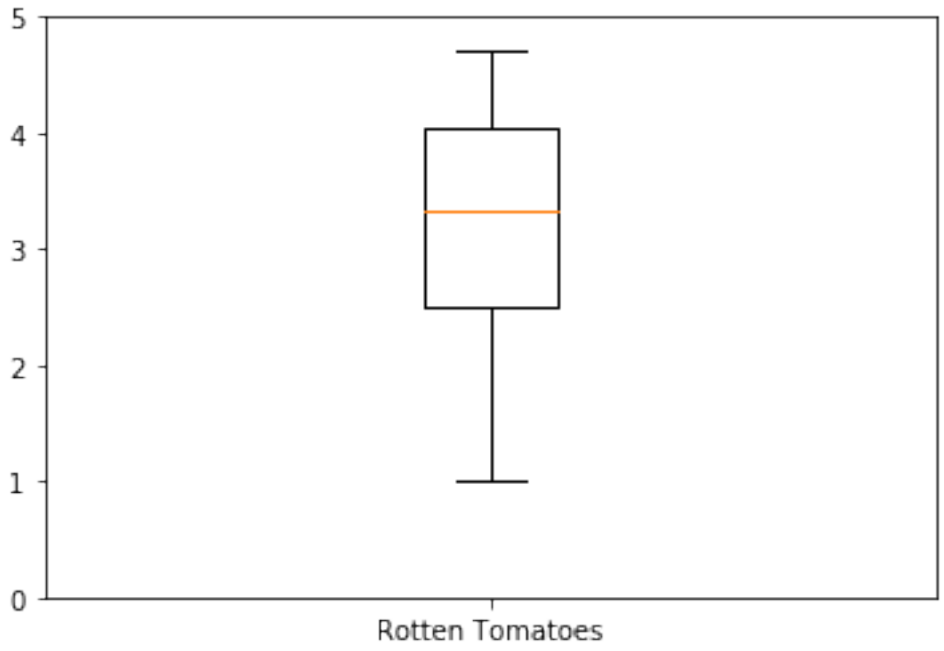

Distribution of Rotten Tomatoes Ratings
50
40
30
20
10
0
0
1
2
3
4
5


Distribution of Metacritic Ratings
50
40
30
20
10
0
0
1
2
3
4
5

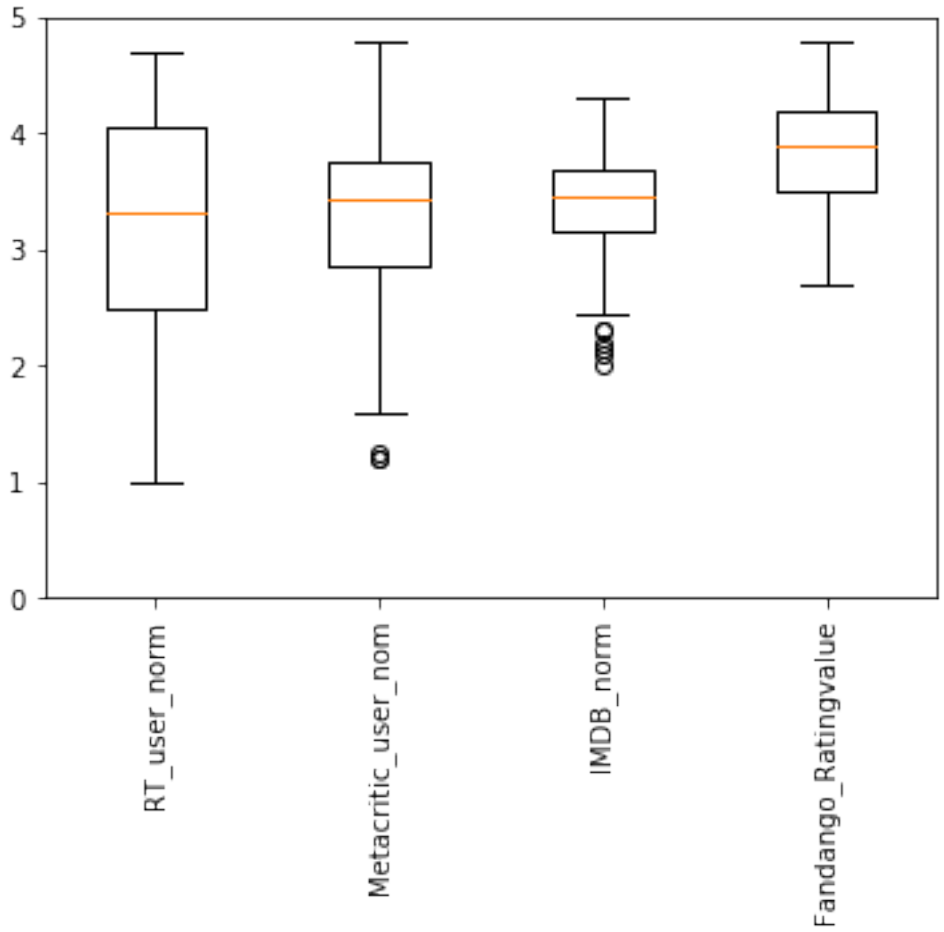

Distribution of IMDB Ratings
50
40
30
20
10
0
0
1
2
3
4
5

1.5 箱型图

In [23]:
```
fig, ax = plt.subplots()
ax.boxplot(norm_reviews['RT_user_norm'])
ax.set_xticklabels(['Rotten Tomatoes'])
ax.set_ylim(0, 5)
plt.show()
```

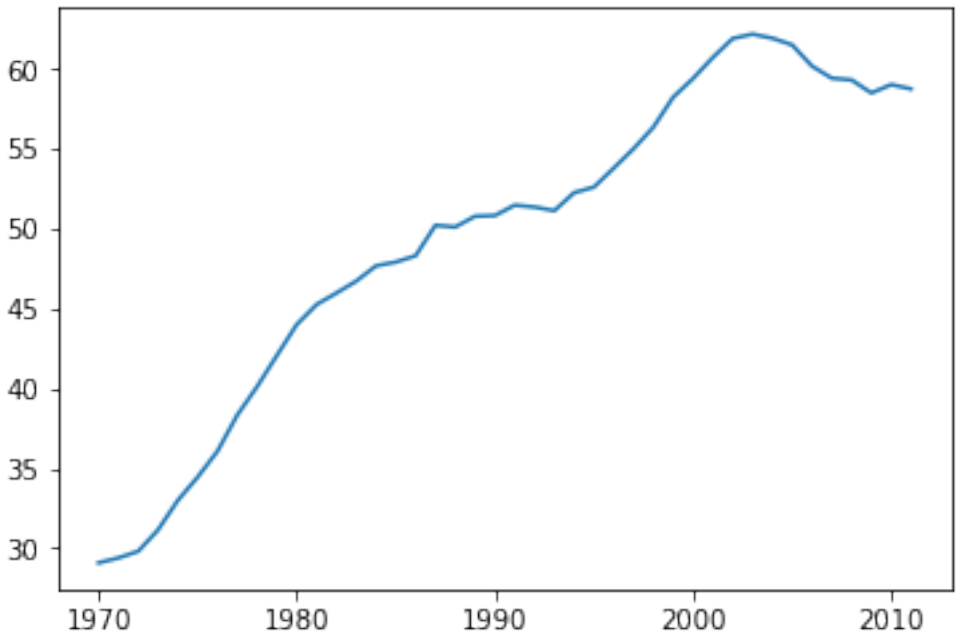


In [24]:
```
num_cols = ['RT_user_norm', 'Metacritic_user_nom', 'IMDB_norm', 'Fandango_Ratingvalue']
fig, ax = plt.subplots()
ax.boxplot(norm_reviews[num_cols].values)
ax.set_xticklabels(num_cols, rotation=90)
ax.set_ylim(0,5)
plt.show()
```

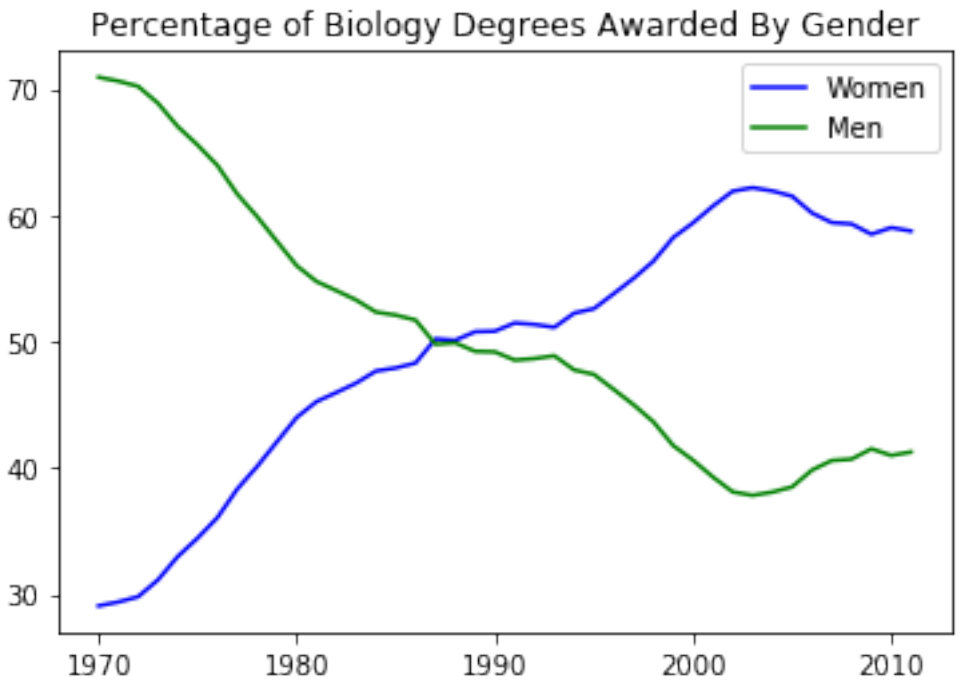


1.6 细节设置

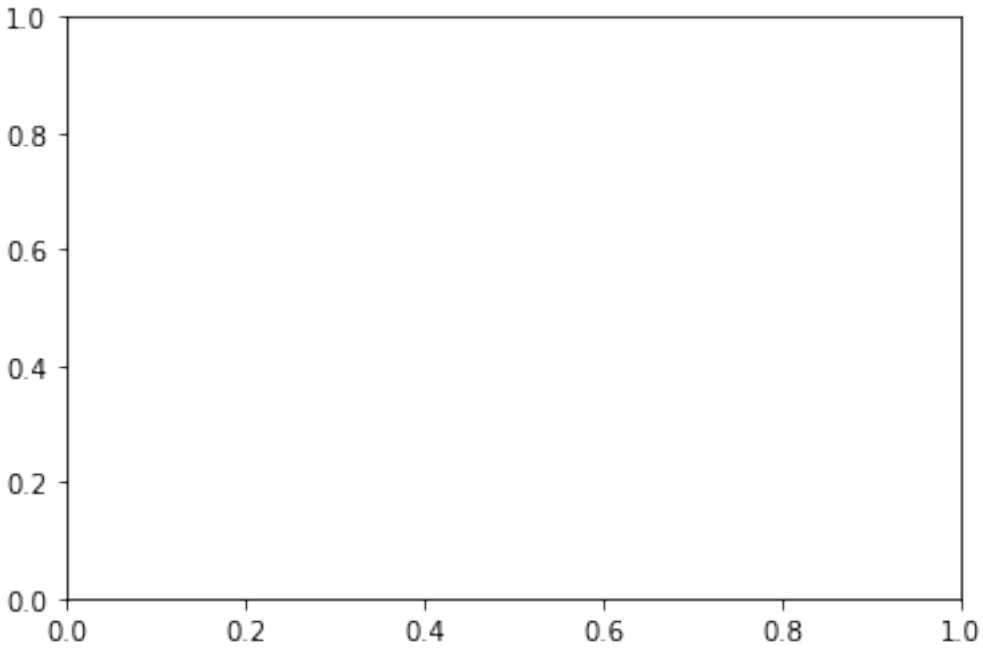
```
In [25]: import pandas as pd
         import matplotlib.pyplot as plt

         women_degrees = pd.read_csv('percent-bachelors-degrees-women-usa.csv')
         plt.plot(women_degrees['Year'], women_degrees['Biology'])
         plt.show()
```

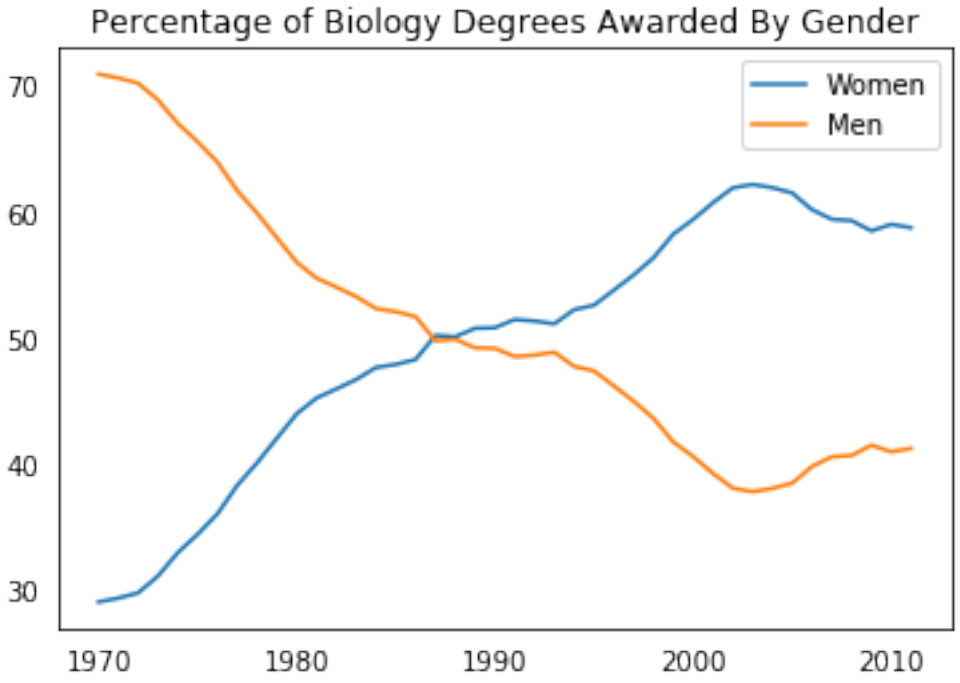


In [26]:
```
#100-women_degrees means men
plt.plot(women_degrees['Year'], women_degrees['Biology'], c='blue', label='Women')
plt.plot(women_degrees['Year'], 100-women_degrees['Biology'], c='green', label='Men')
plt.legend(loc='upper right')
plt.title('Percentage of Biology Degrees Awarded By Gender')
plt.show()
```



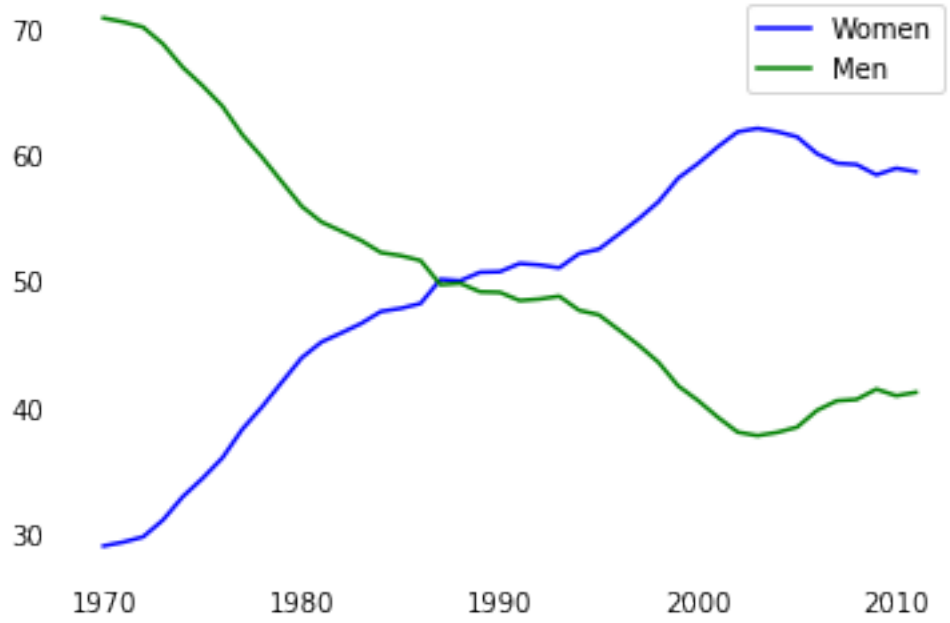
In [27]:
```
fig, ax = plt.subplots()
# Add your code here.
fig, ax = plt.subplots()
ax.plot(women_degrees['Year'], women_degrees['Biology'], label='Women')
ax.plot(women_degrees['Year'], 100-women_degrees['Biology'], label='Men')

ax.tick_params(bottom="off", top="off", left="off", right="off")
ax.set_title('Percentage of Biology Degrees Awarded By Gender')
ax.legend(loc="upper right")

plt.show()
```





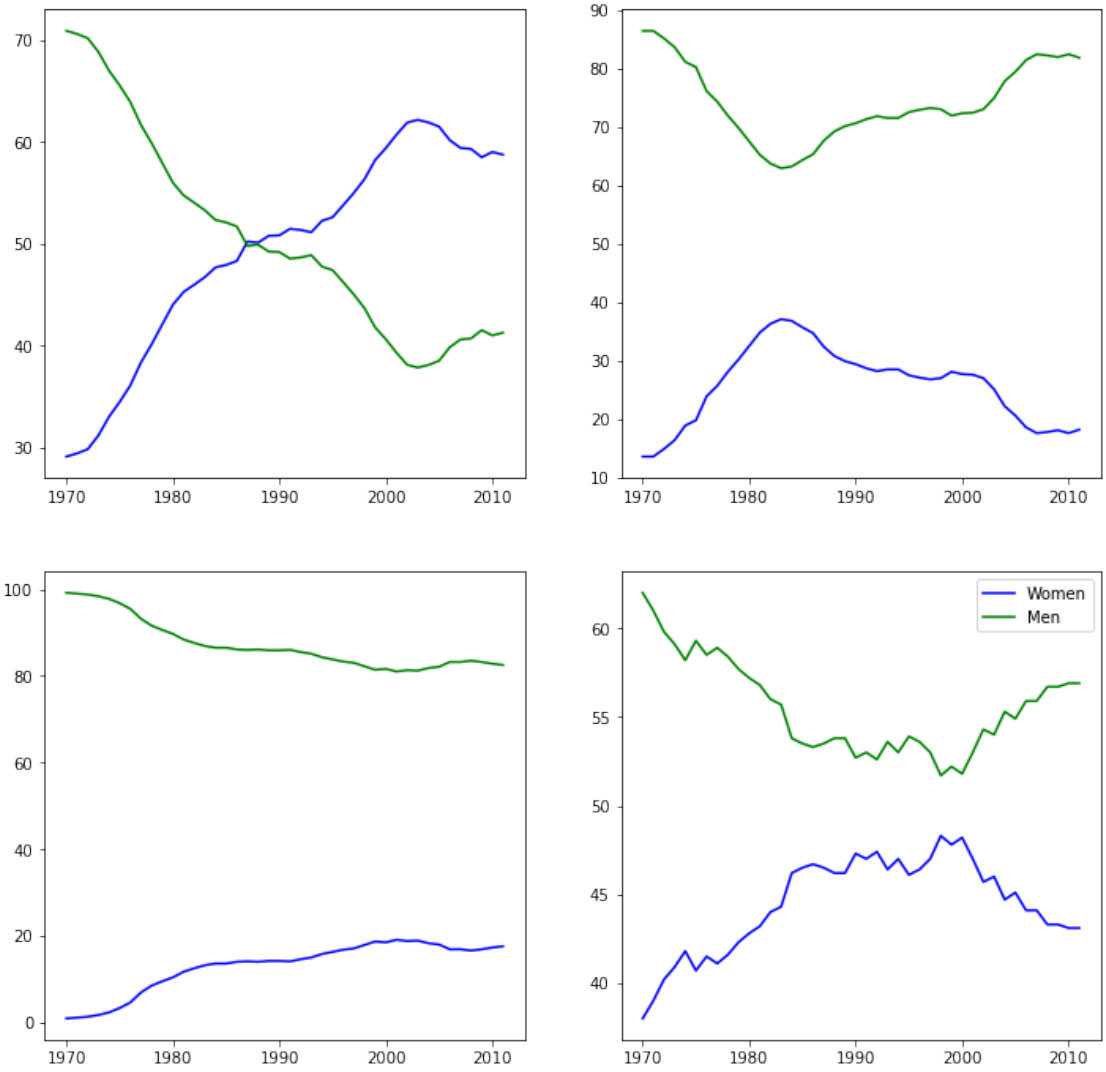

```
In [28]: fig, ax = plt.subplots()
         ax.plot(women_degrees['Year'], women_degrees['Biology'], c='blue', label='Women')
```

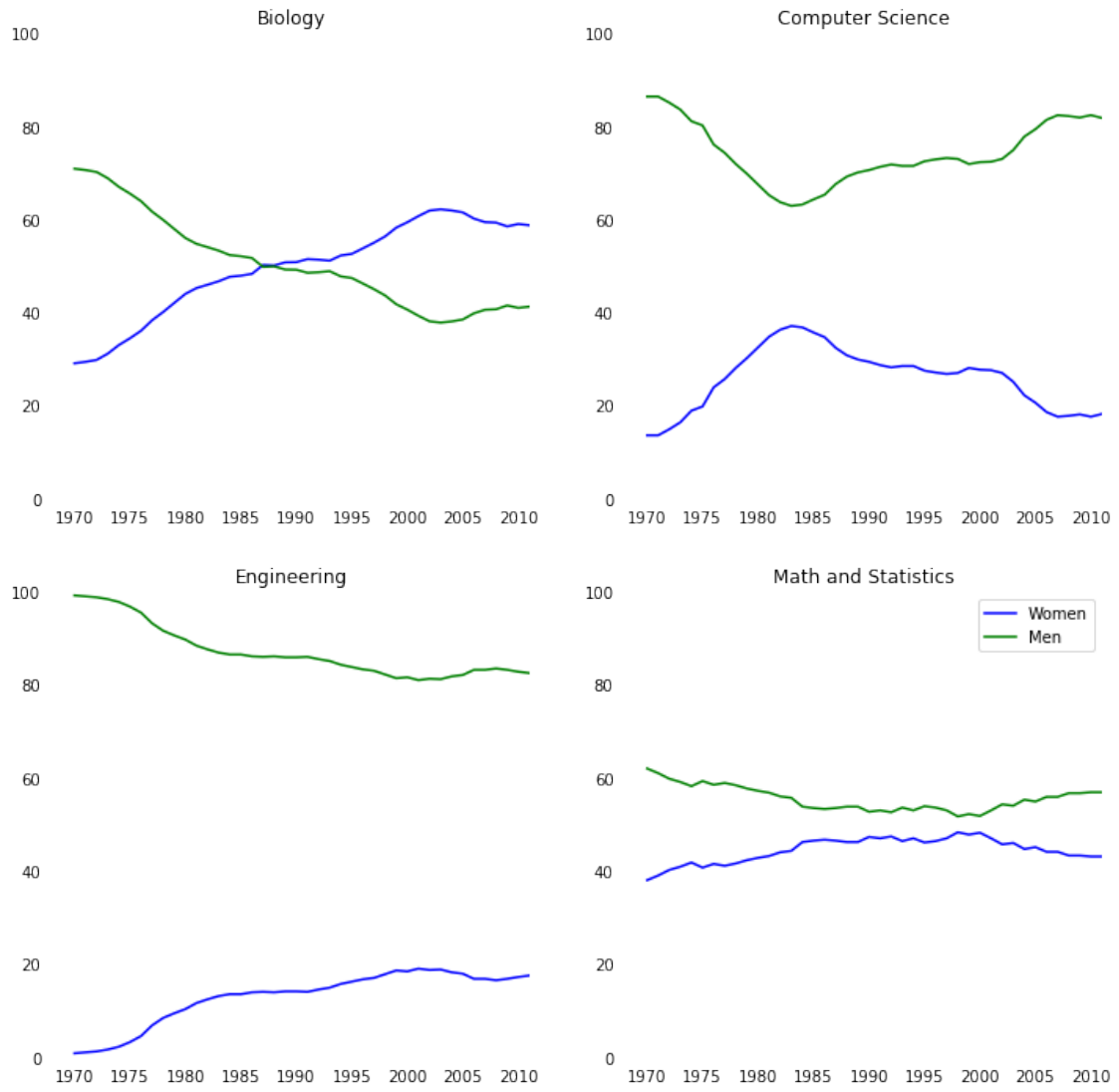
```
ax.plot(women_degrees['Year'], 100-women_degrees['Biology'], c='green', label='Men')
ax.tick_params(bottom="off", top="off", left="off", right="off")

for key,spine in ax.spines.items():
    spine.set_visible(False)
# End solution code.
ax.legend(loc='upper right')
plt.show()
```



In [29]:
```
major_cats = ['Biology', 'Computer Science', 'Engineering', 'Math and Statistics']
fig = plt.figure(figsize=(12, 12))

for sp in range(0,4):
    ax = fig.add_subplot(2,2,sp+1)
    ax.plot(women_degrees['Year'], women_degrees[major_cats[sp]], c='blue', label='Women'
    ax.plot(women_degrees['Year'], 100-women_degrees[major_cats[sp]], c='green', label='M
    # Add your code here.

# Calling pyplot.legend() here will add the legend to the last subplot that was created.
plt.legend(loc='upper right')
plt.show()
```

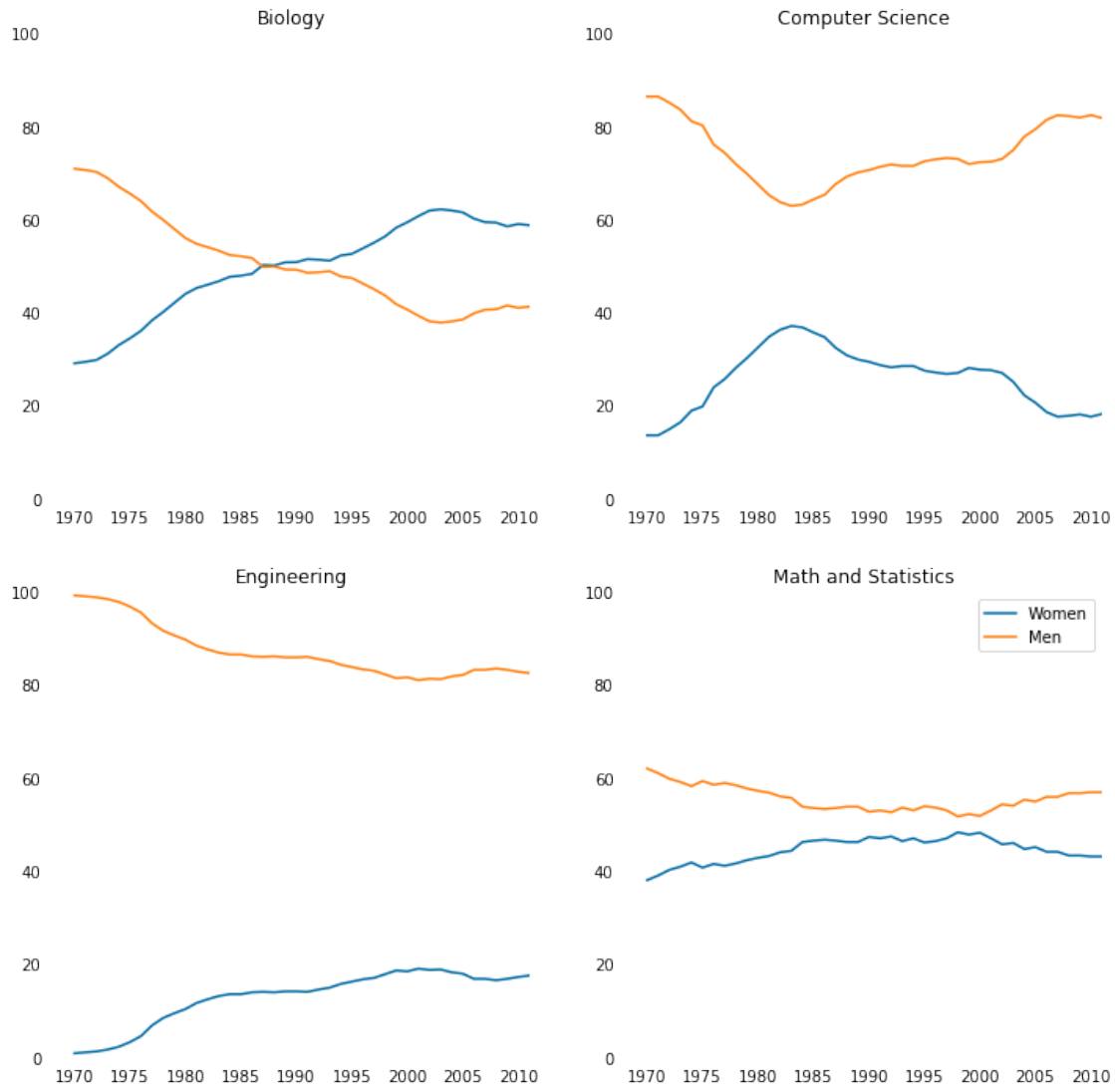
```
major_cats = ['Biology', 'Computer Science', 'Engineering', 'Math and Statistics']
fig = plt.figure(figsize=(12, 12))

for sp in range(0,4):
    ax = fig.add_subplot(2,2,sp+1)
    ax.plot(women_degrees['Year'], women_degrees[major_cats[sp]], c='blue', label='Women'
    ax.plot(women_degrees['Year'], 100-women_degrees[major_cats[sp]], c='green', label='M
    for key,spine in ax.spines.items():
        spine.set_visible(False)
    ax.set_xlim(1968, 2011)
    ax.set_ylim(0,100)
    ax.set_title(major_cats[sp])
    ax.tick_params(bottom="off", top="off", left="off", right="off")

# Calling pyplot.legend() here will add the legend to the last subplot that was created.
plt.legend(loc='upper right')
plt.show()
```


70
60
50
40
30
1970
1980
1990
2000
2010
90
80
70
60
50
40
30
20
10
100
80
60
40
20
0
Women
Men
55
45



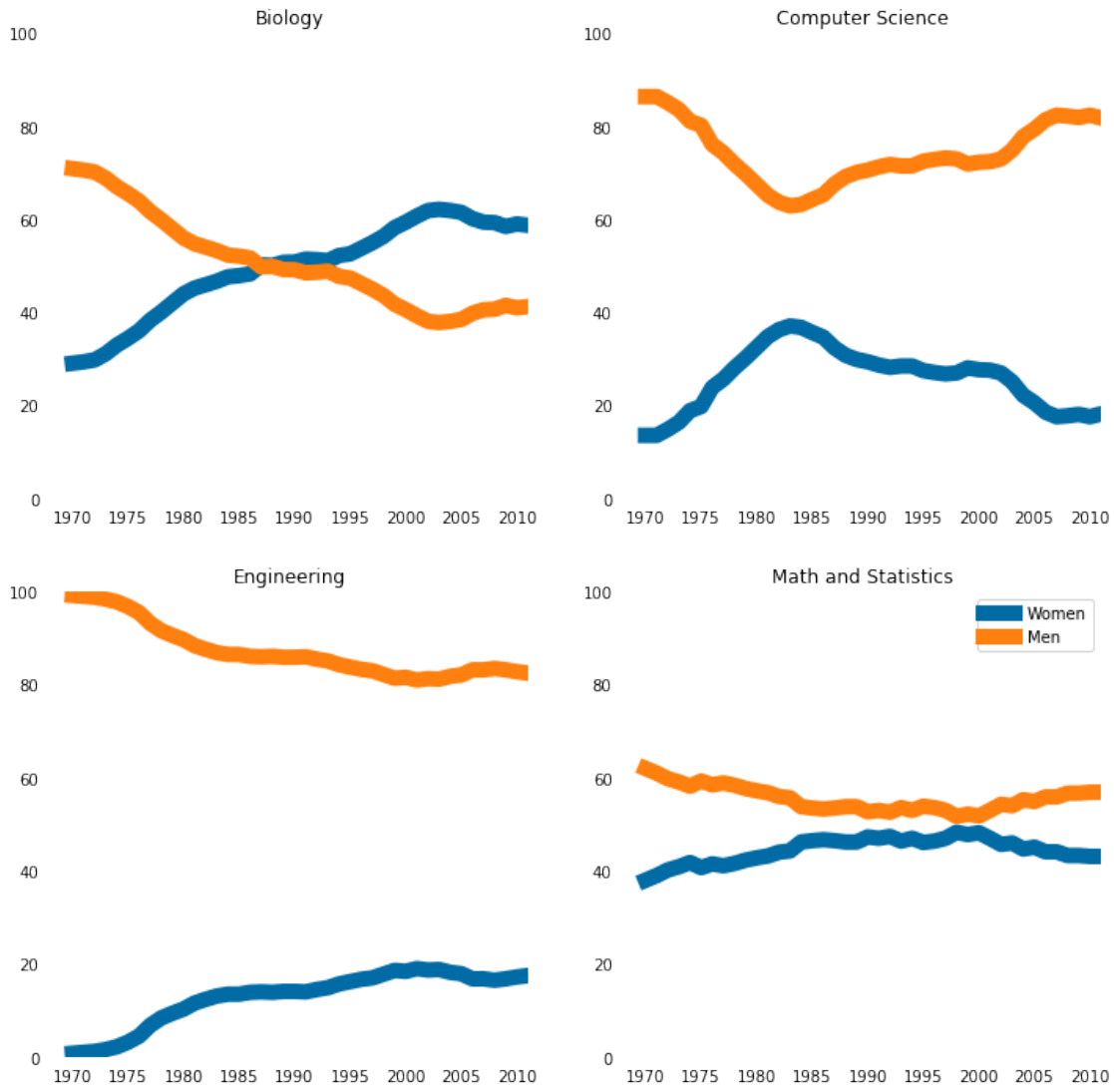
In [30]:
```
#Color
import pandas as pd
import matplotlib.pyplot as plt

women_degrees = pd.read_csv('percent-bachelors-degrees-women-usa.csv')
major_cats = ['Biology', 'Computer Science', 'Engineering', 'Math and Statistics']


cb_dark_blue = (0/255, 107/255, 164/255)
cb_orange = (255/255, 128/255, 14/255)
```

```
fig = plt.figure(figsize=(12, 12))

for sp in range(0,4):
    ax = fig.add_subplot(2,2,sp+1)
    # The color for each line is assigned here.
    ax.plot(women_degrees['Year'], women_degrees[major_cats[sp]], c=cb_dark_blue, label='
    ax.plot(women_degrees['Year'], 100-women_degrees[major_cats[sp]], c=cb_orange, label=
    for key,spine in ax.spines.items():
        spine.set_visible(False)
    ax.set_xlim(1968, 2011)
    ax.set_ylim(0,100)
    ax.set_title(major_cats[sp])
    ax.tick_params(bottom="off", top="off", left="off", right="off")

plt.legend(loc='upper right')
plt.show()
```



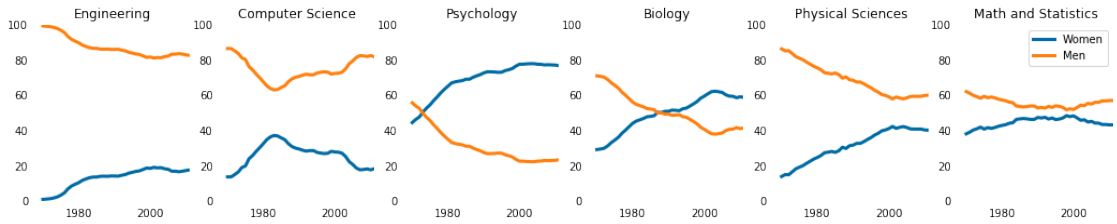
In [31]:
```
#Setting Line Width
cb_dark_blue = (0/255, 107/255, 164/255)
cb_orange = (255/255, 128/255, 14/255)

fig = plt.figure(figsize=(12, 12))

for sp in range(0,4):
    ax = fig.add_subplot(2,2,sp+1)
    # Set the line width when specifying how each line should look.
    ax.plot(women_degrees['Year'], women_degrees[major_cats[sp]], c=cb_dark_blue, label='
    ax.plot(women_degrees['Year'], 100-women_degrees[major_cats[sp]], c=cb_orange, label=
```

```
        for key,spine in ax.spines.items():
            spine.set_visible(False)
        ax.set_xlim(1968, 2011)
        ax.set_ylim(0,100)
        ax.set_title(major_cats[sp])
        ax.tick_params(bottom="off", top="off", left="off", right="off")

    plt.legend(loc='upper right')
    plt.show()
```



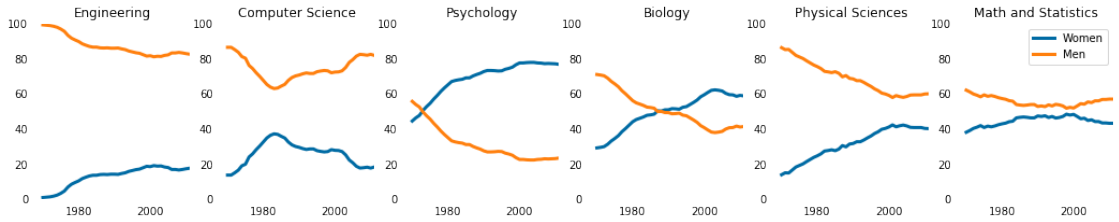

```
In [32]: stem_cats = ['Engineering', 'Computer Science', 'Psychology', 'Biology', 'Physical Scienc
         fig = plt.figure(figsize=(18, 3))
```

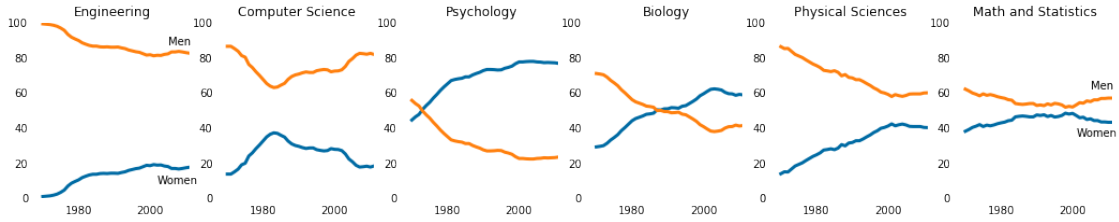
```
    for sp in range(0,6):
        ax = fig.add_subplot(1,6,sp+1)
        ax.plot(women_degrees['Year'], women_degrees[stem_cats[sp]], c=cb_dark_blue, label='W
        ax.plot(women_degrees['Year'], 100-women_degrees[stem_cats[sp]], c=cb_orange, label='
        for key,spine in ax.spines.items():
            spine.set_visible(False)
        ax.set_xlim(1968, 2011)
        ax.set_ylim(0,100)
        ax.set_title(stem_cats[sp])
        ax.tick_params(bottom="off", top="off", left="off", right="off")

    plt.legend(loc='upper right')
    plt.show()
```



In [33]:
```
fig = plt.figure(figsize=(18, 3))

    for sp in range(0,6):
        ax = fig.add_subplot(1,6,sp+1)
        ax.plot(women_degrees['Year'], women_degrees[stem_cats[sp]], c=cb_dark_blue, label='W
        ax.plot(women_degrees['Year'], 100-women_degrees[stem_cats[sp]], c=cb_orange, label='
        for key,spine in ax.spines.items():
            spine.set_visible(False)
        ax.set_xlim(1968, 2011)
        ax.set_ylim(0,100)
        ax.set_title(stem_cats[sp])
        ax.tick_params(bottom="off", top="off", left="off", right="off")
    plt.legend(loc='upper right')
    plt.show()
    fig = plt.figure(figsize=(18, 3))

    for sp in range(0,6):
```

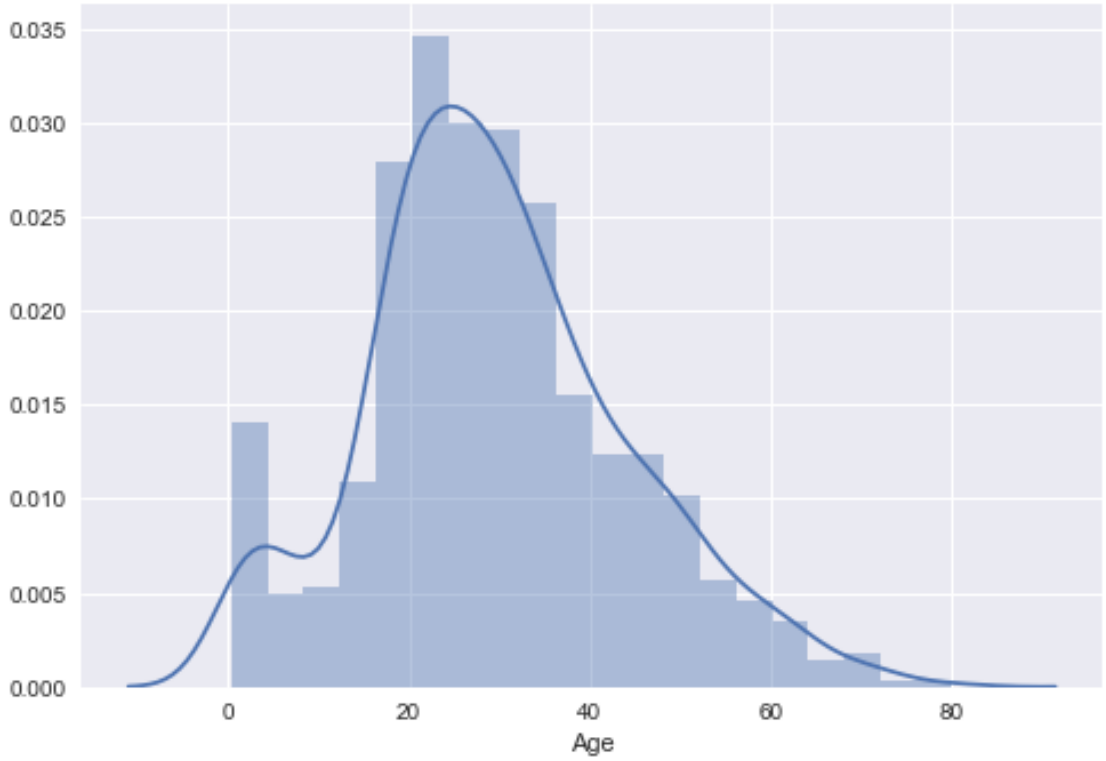
```
        ax = fig.add_subplot(1,6,sp+1)
        ax.plot(women_degrees['Year'], women_degrees[stem_cats[sp]], c=cb_dark_blue, label='W
        ax.plot(women_degrees['Year'], 100-women_degrees[stem_cats[sp]], c=cb_orange, label='
        for key,spine in ax.spines.items():
            spine.set_visible(False)
        ax.set_xlim(1968, 2011)
        ax.set_ylim(0,100)
        ax.set_title(stem_cats[sp])
        ax.tick_params(bottom="off", top="off", left="off", right="off")

        if sp == 0:
            ax.text(2005, 87, 'Men')
            ax.text(2002, 8, 'Women')
        elif sp == 5:
            ax.text(2005, 62, 'Men')
            ax.text(2001, 35, 'Women')
    plt.show()
```






```
In [34]: import pandas as pd
         titanic = pd.read_csv('train.csv')
         cols = ['Survived', 'Pclass', 'Sex', 'Age', 'SibSp', 'Parch', 'Fare', 'Embarked']
         titanic = titanic[cols].dropna()

In [35]: import seaborn as sns
         import matplotlib.pyplot as plt
```

```
sns.distplot(titanic['Age'])
plt.show()
```



In [ ]: