Summary and Analysis

Deliverable 1: A ride-sharing summary DataFrame by city type (*35* points)

Deliverable 1 Instructions

Using the Pandas `groupby()` function with the `count()` and `sum()` methods on PyBer DataFrame columns, get the total number of rides, total number of drivers, and the total fares for each city type. Then, calculate the average fare per

ride and average fare per driver for each city type. Finally, add this data to a new DataFrame, then format the columns.

REWIND

For this deliverable, you've already done the following in this module:

- **Lesson 5.3.2:** Use the `groupby()` function
- **Lesson 5.3.2:** Use the `count()` method
- **Lesson 5.4.1:** Format numbers and strings
- **Lesson 5.5.1:** Use the `sum()` method

1. Download the `PyBer_Challenge_starter_code.ipynb` file into your PyBer_Analysis folder and rename it `PyBer_Challenge.ipynb`.
2. Use the step-by-step instructions below to add code where indicated by the numbered comments in the starter code file.
3. In Step 1, use the `groupby()` function to create a Series of data that has the type of city as the index, then apply the `count()` method to the "ride_id" column.
4. In Step 2, use the `groupby()` function to create a Series of data that has the type of city as the index, then apply the `sum()` method to the "driver_count" column.
5. In Step 3, use the `groupby()` function to create a Series of data that has the type of city as the index, then apply the `sum()` method to the "fare" column.

6. In Step 4, calculate the average fare per ride by city type by dividing the sum of all the fares by the total rides.
7. In Step 5, calculate the average fare per driver by city type by dividing the sum of all the fares by the total drivers.
8. In Step 6, create a PyBer summary DataFrame with all the data gathered from Steps 1-5, using the column names shown below:.

9. In Step 7, use the provided code snippet to remove the index name ("type") from the PyBer summary DataFrame.
10. In Step 8, format the columns of the Pyber summary DataFrame to look like this:

Deliverable 1 Requirements

You will earn a perfect score for Deliverable 1 by completing all requirements below:

- The total number of rides for each city type is retrieved. **(5 pt)**
- The total number of drivers for each city type is retrieved. **(5 pt)**
- The sum of the fares for each city type is retrieved. **(5 pt)**
- The average fare per ride for each city type is calculated. **(5 pt)**
- The average fare per driver for each city type is calculated. **(5 pt)**

- A PyBer summary DataFrame is created. **(5 pt)**
- The PyBer summary DataFrame is formatted as shown in the example. **(5 pt)**

Deliverable 2: A multiple-line chart of total fares for each city type (45 points)

Deliverable 2 Instructions

Using your Pandas skills and two new functions, `pivot()` and `resample()`, create a multiple-line graph that shows the total fares for each week by city type.

REWIND

For this deliverable, you've already done the following in this module:

- **Lesson 5.1.3:** Create a line chart using the object-oriented interface method
- **Lesson 5.1.4:** Annotate charts
- **Lesson 5.1.10:** Graph a Pandas DataFrame
- **Lesson 5.3.2:** Use the `groupby()` function
- **Lesson 5.5.1:** Use the `sum()` method

Use the step-by-step instructions below to add code where indicated by the numbered comments in the starter code file:

1. In Step 1, create a new DataFrame with multiple indices using the `groupby()` function on the "type" and "date" columns of the `pyber_data_df` DataFrame, then apply the `sum()` method on the "fare" column to show the total fare amount for each date.
2. In Step 2, use the provided code snippet to reset the index. This is needed to use the `pivot()` function in the next step (Step 3).
3. In Step 3, use the `pivot()` function to convert the DataFrame from the previous step so that the index is the "date," each column is a city "type," and the values are the "fare."
    - After this step, you'll see that each cell has the total fare for the date and time, as shown in the following image.

Note: In cells where there is no fare to be summed for that row, the cell will be filled with NaNs.

If you'd like a hint on how to create a pivot table from a DataFrame, that's totally okay. If not, that's great too. You can always revisit this later if you change your mind.

HINT

4. In Step 4, create a new DataFrame by using the loc method on the following date range: 2019-01-01 through 2019-04-28.
5. In Step 5, use the provided code snippet to reset the index of the DataFrame from the previous step (Step 4) to a datetime data type. This is necessary to use the `resample()` method in Step 7.

6. In Step 6, use the provided code snippet, `df.info()`, to check that the "date" is a datetime data type.
7. In Step 7, create a new DataFrame by applying the `resample()` function to the DataFrame you modified in Step 5. Resample the data in weekly bins, then apply the `sum()` method to get the total fares for each week.

If you'd like a hint on how to create a pivot table from a DataFrame, that's totally okay. If not, that's great too. You can always revisit this later if you change your mind.

HINT

- After creating the resampled DataFrame in Step 7, confirm that your DataFrame looks like this:

8. Finally, in Step 8, graph the resampled DataFrame from Step 7 using the object-oriented interface method and the `df.plot()` method, as well as the Matplotlib `"fivethirtyeight"` graph style code snippet provided in the starter code. Annotate the y-axis label and the title, then use the appropriate code to save the figure as `PyBer_fare_summary.png` in your "analysis" folder.
    - Confirm that your multiple-line chart looks like the following image, where each week is a peak or dip in the line graphs.

Deliverable 2 Requirements

You will earn a perfect score for Deliverable 2 by completing all requirements below:

- A DataFrame was created using the `groupby()` function on the "type" and "date" columns, and the `sum()` method is applied on the "fare" column to show the total fare amount for each date and time. **(10 pt)**
- A DataFrame was created using the `pivot()` function where the index is the "date," the columns are the city "type," and the values are the "fare." **(10 pt)**
- A DataFrame was created using the `loc` method on the date range: 2019-01-01 through 2019-04-28. **(5 pt)**
- A DataFrame was created using the `resample()` function in weekly bins and shows the sum of the fares for each week. **(10 pt)**
- An annotated chart showing the total fares by city type is created and saved to the "analysis" folder. **(10 pt)**

Deliverable 3: A written report for the PyBer analysis (20 points)

Deliverable 3 Instructions

Use your repository README file to write your analysis of how to address any disparities in the ride-sharing data among the city types.

The analysis should contain the following:

1. **Overview of the analysis:** Explain the purpose of the new analysis.
2. **Results:** Using images from the summary DataFrame and multiple-line chart, describe the differences in ride-sharing data among the different city types.
3. **Summary:** Based on the results, provide three business recommendations to the CEO for addressing any disparities among the city types.

Deliverable 3 Requirements

Structure, Organization, and Formatting (6 points)

The written analysis has the following structure, organization, and formatting:

- There is a title, and there are multiple sections. **(2 pt)**
- Each section has a heading and subheading. **(2 pt)**
- Links to images are working and displayed correctly. **(2 pt)**

Analysis (14 points)

The written analysis has the following:

1. Overview of the analysis: since January 2019 rural suburban and urban total fare by city type rose steadily through February on all three lines in on the graph with a spike through march and continuing a scattered pattern in into the summer months.

    - The purpose of the new analysis is well defined. **(3 pt)**

2. Results:
    - There is a description of the differences in ride-sharing data among the different city types. Ride-sharing data include the total rides, total drivers, total fares, average fare per ride and driver, and total fare by city type. **(7 pt)**

3. Summary:
    - There is a statement summarizing three business recommendations to the CEO for addressing any disparities among the city types. **(4 pt)**

Submission

Once you're ready to submit, make sure to check your work against the rubric to ensure you are meeting the requirements for this Challenge one final time. It's easy to overlook items when you're in the zone!

As a reminder, the deliverables for this Challenge are as follows:

- Deliverable 1: A ride-sharing summary DataFrame by city type.
- Deliverable 2: A multiple-line chart of total fares for each city type.
- Deliverable 3: A written report for the PyBer analysis (README.md).

Upload the following to your PyBer_Analysis GitHub repository:

1. The `PyBer_Challenge.ipynb` file.
    - The results need to be kept populated in the `PyBer_Challenge.ipynb` file. Do not clear the output from the `PyBer_Challenge.ipynb` file before uploading to GitHub.
2. The "Resources" folder with the `city_data.csv` and `ride_data.csv` files.
3. The "analysis" folder with the `PyBer_fare_summary.png`.
4. An updated README.md that has your written analysis.

To submit your challenge assignment for grading in Bootcamp Spot, click Start Assignment, click the Website URL tab, then provide the URL of your PyBer_Analysis GitHub repository, and then click Submit. Comments are disabled for graded submissions in BootCampSpot. If you have questions about your feedback, please notify your instructional staff or the Student Success Manager. If you would like to resubmit your work for an improved grade, you can use the **Re-Submit Assignment** button to upload new links. You may resubmit up to 3 times for a total of 4 submissions.

Pyber Challenge

4.3 Loading and Reading CSV files

In [1]:

```
# Add Matplotlib inline magic command
%matplotlib inline
# Dependencies and Setup
import matplotlib.pyplot as plt
import pandas as pd

# File to Load (Remember to change these)
city_data_to_load = "city_data.csv"
ride_data_to_load = "ride_data.csv"

# Read the City and Ride Data
city_data_df = pd.read_csv(city_data_to_load)
ride_data_df = pd.read_csv(ride_data_to_load)
```

Merge the DataFrames

[pyberanalysis-Copy1 - Jupyter Notebook]

In [2]:

```
# Combine the data into a single dataset
pyber_data_df = pd.merge(ride_data_df, city_data_df, how="left", on=["city",
"city"])

# Display the data table for preview
pyber_data_df.head()
```

Out[2]:

	city	date	fare	ride_id	driver_count	type
0	Lake Jonathanshire	1/14/19 10:14	13.83	5.739410e+12	5	Urban

	city	date	fare	ride_id	driver_count	type
1	South Michelleport	3/4/19 18:24	30.24	2.343910e+12	72	Urban
2	Port Samanthamouth	2/24/19 4:29	33.44	2.005070e+12	57	Urban
3	Rodneyfort	2/10/19 23:22	23.44	5.149250e+12	34	Urban
4	South Jack	3/6/19 4:28	34.58	3.908450e+12	46	Urban

Deliverable 1: Get a Summary DataFrame

In [3]:
```
#  1. Get the total rides for each city type
```

In [4]:
```
# 2. Get the total drivers for each city type
```

In [5]:
```
#  3. Get the total amount of fares for each city type
```

In [6]:
```
#  4. Get the average fare per ride for each city type.
```

In [7]:
```
# 5. Get the average fare per driver for each city type.
```

In [8]:
```
#  6. Create a PyBer summary DataFrame.
```

In [9]:
```
#  7. Cleaning up the DataFrame. Delete the index name
pyber_summary_df.index.name = None
```

In [10]:
```
#  8. Format the columns.
```

Deliverable 2. Create a multiple line plot that shows the total weekly of the fares for each type of city.

In [11]:
```
# 1. Read the merged DataFrame
```

In [12]:
```
# 2. Using groupby() to create a new DataFrame showing the sum of the fares
#  for each date where the indices are the city type and date.
```

In [13]:

```
# 3. Reset the index on the DataFrame you created in #1. This is needed to
use the 'pivot()' function.
# df = df.reset_index()
```

In [14]:

```
# 4. Create a pivot table with the 'date' as the index, the columns ='type',
and values='fare'
# to get the total fares for each type of city by the date.
```

In [15]:

```
# 5. Create a new DataFrame from the pivot table DataFrame using loc on the
given dates, '2019-01-01':'2019-04-29'.
```

In [16]:

```
# 6. Set the "date" index to datetime datatype. This is necessary to use the
resample() method in Step 8.
# df.index = pd.to_datetime(df.index)
```

In [17]:

```
# 7. Check that the datatype for the index is datetime using df.info()
```

In [18]:

```
# 8. Create a new DataFrame using the "resample()" function by week 'W' and
get the sum of the fares for each week.
```

In [19]:

```
# 8. Using the object-oriented interface method, plot the resample DataFrame
using the df.plot() function.

# Import the style from Matplotlib.
from matplotlib import style
# Use the graph style fivethirtyeight.
style.use('fivethirtyeight')
```

```
%matplotlib inline
```

In [4]:

```
# Import dependencies.
import matplotlib.pyplot as plt
```

In [3]:

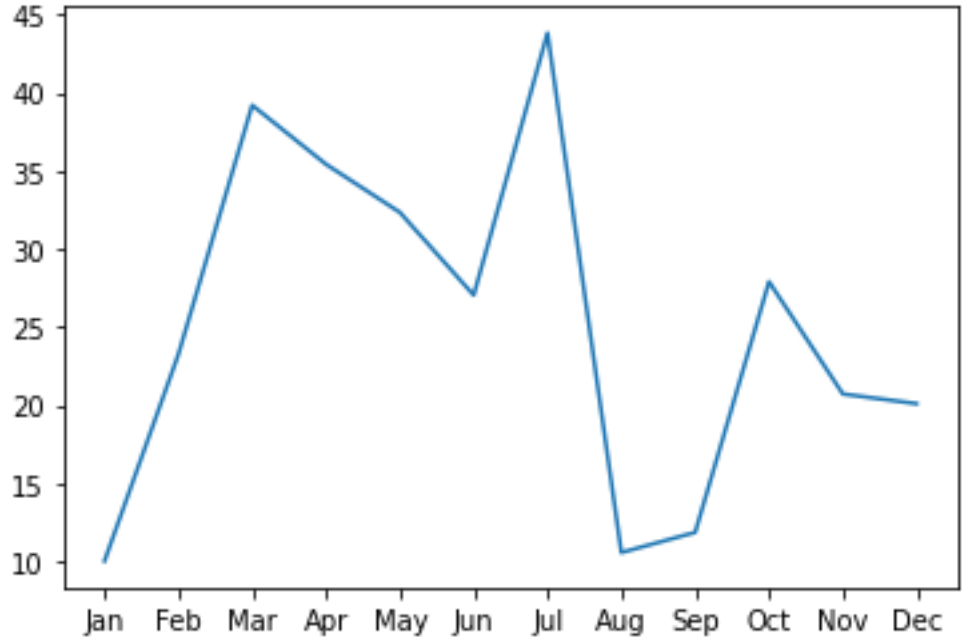
```
#Set the x-axis to alist of strings for each month
x_axis = ["Jan", "Feb",
"Mar","Apr","May","Jun","Jul","Aug","Sep","Oct","Nov","Dec"]
y_axis =
[10.02,23.24,39.20,35.42,32.34,27.04,43.82,10.56,11.85,27.90,20.71,20.09 ]
```

In [4]:

```
# Create the plot
plt.plot(x_axis, y_axis)
```

Out[4]:

```
[<matplotlib.lines.Line2D at 0x240f92e68b0>]
```

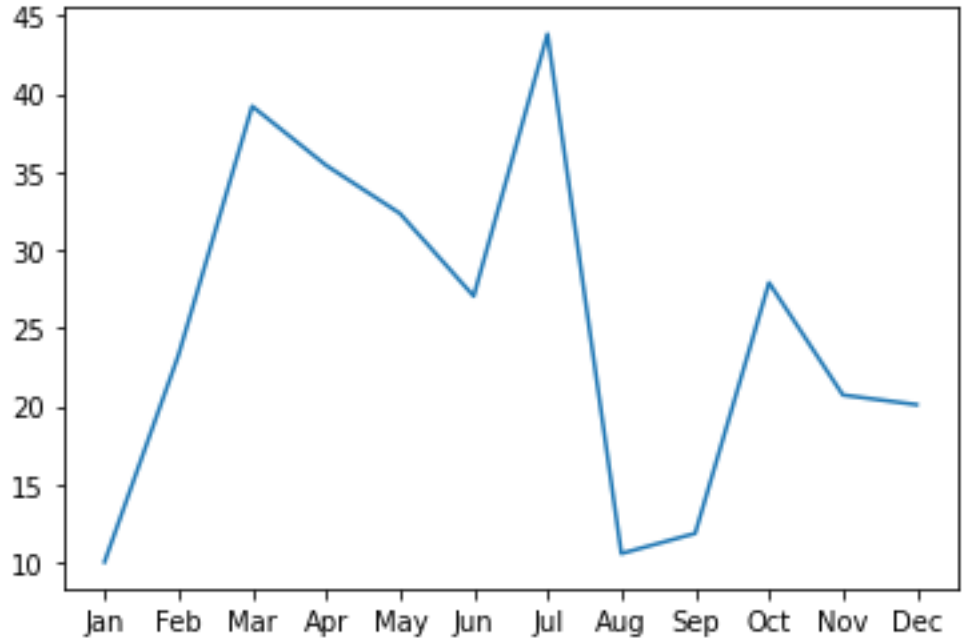


In [5]:

```
#Create the plot with object oriented programming
fig, ax = plt.subplots()
ax.plot(x_axis, y_axis)
```

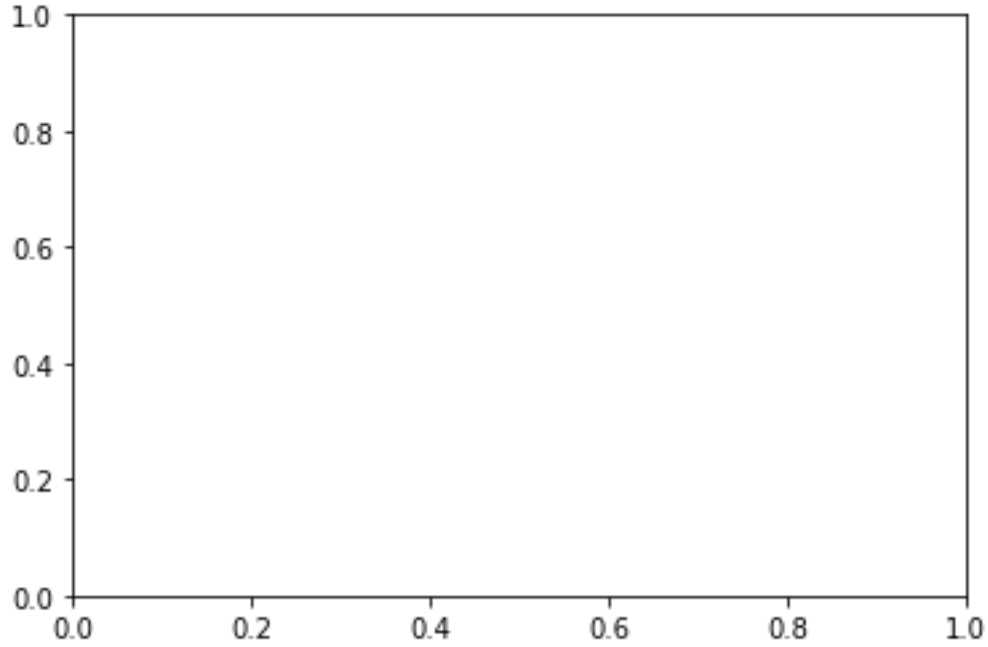
Out[5]:

```
[<matplotlib.lines.Line2D at 0x240f9ab0190>]
```



In [8]:

```
# Create the plot with ax.plt()
fig = plt.figure()
ax = fig.add_subplot()
```

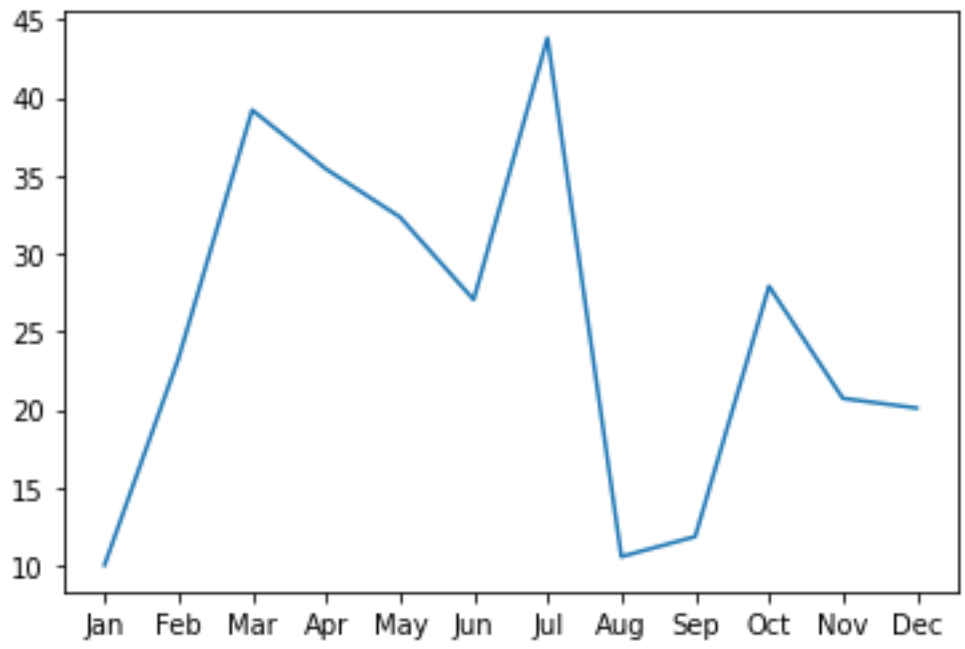


In [9]:

```
# Create the plot with ax.plt()
fig = plt.figure()
ax = fig.add_subplot()
ax.plot(x_axis, y_axis)
```

Out[9]:

```
[<matplotlib.lines.Line2D at 0x240f9d47190>]
```

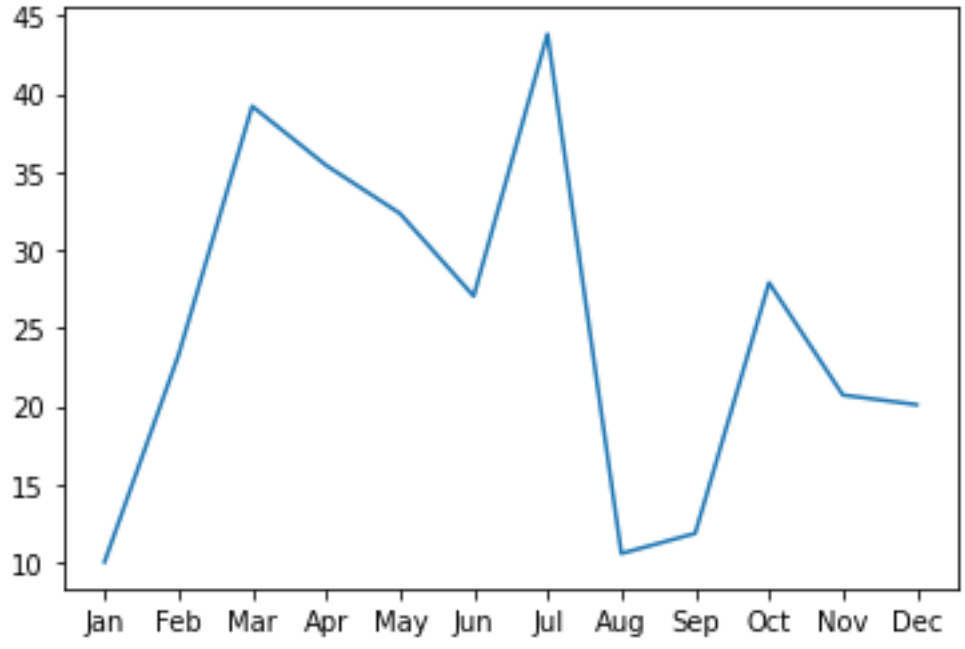


In [10]:

```
#Create the plot with ax.plt
ax = plt.axes()
ax.plot(x_axis, y_axis)
```

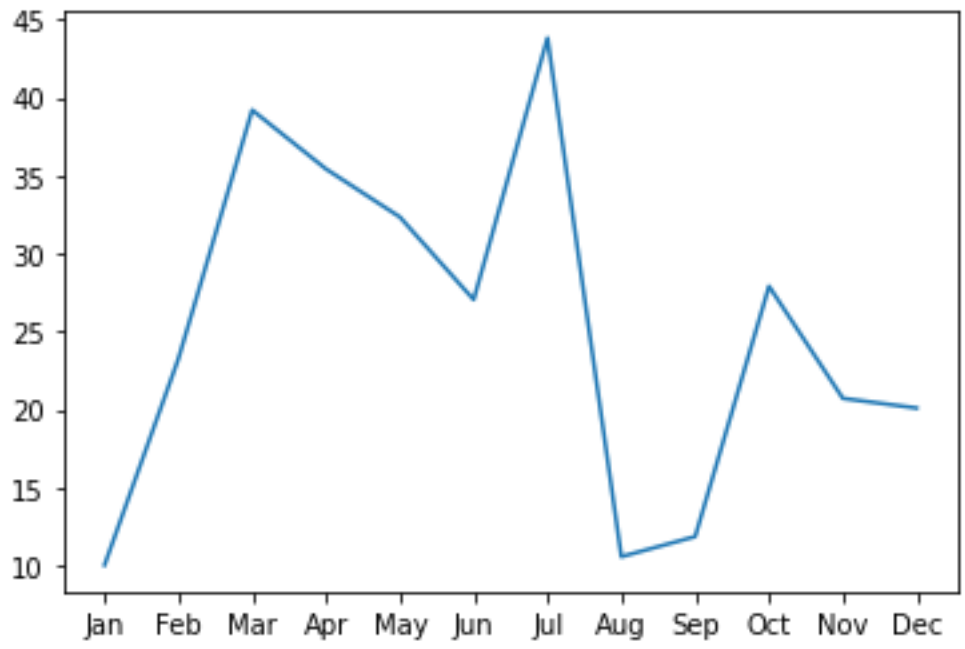
Out[10]:

```
[<matplotlib.lines.Line2D at 0x240f9db72b0>]
```



In [12]:

```
#Create the plot with ax.plt
plt.plot(x_axis, y_axis)
plt.show()
```

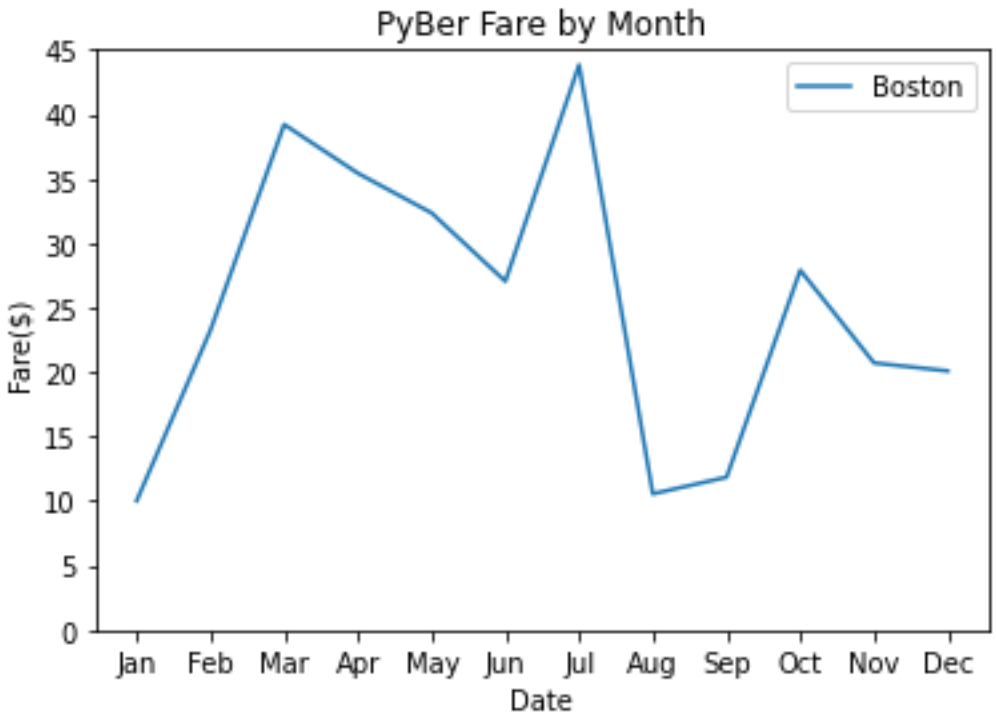


In [16]:

```
#Create the plot and add a label for the legend
plt.plot(x_axis, y_axis, label = "Boston")

#Create lables for x and y axes
plt.xlabel("Date")
plt.ylabel("Fare($)")

#Set the y limit between 0 and 45
plt.ylim(0,45)

#Create a title
plt.title("PyBer Fare by Month")

#Add the legend
plt.legend()
```

Out[16]:

```
<matplotlib.legend.Legend at 0x240fb01cbb0>
```

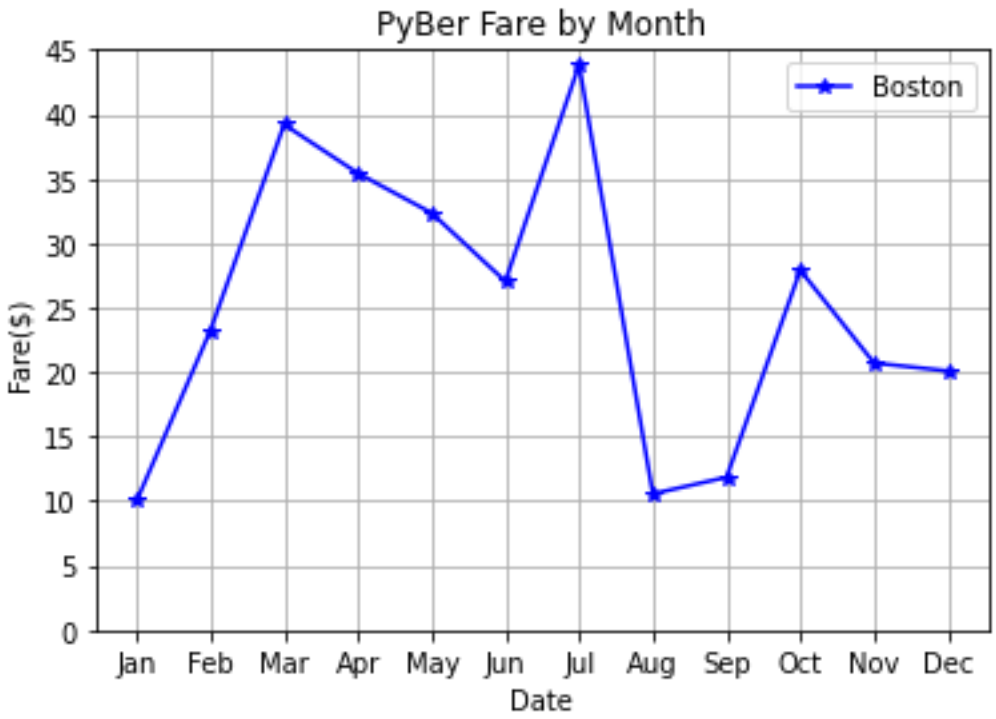


In [23]:

```
# Create the plot and add a label for legend and add color
plt.plot(x_axis, y_axis,marker = "*" , color = "blue", label ="Boston")

# Create labels for x and y axis
plt.xlabel("Date")
plt.ylabel("Fare($)")

#Set the y limit  between 0 and 45
plt.ylim(0,45)

#Create title
plt.title("PyBer Fare by Month")

#Add a grid
plt.grid()

#Add legend
plt.legend()
```

Out[23]:

```
<matplotlib.legend.Legend at 0x240fb23fa30>
```

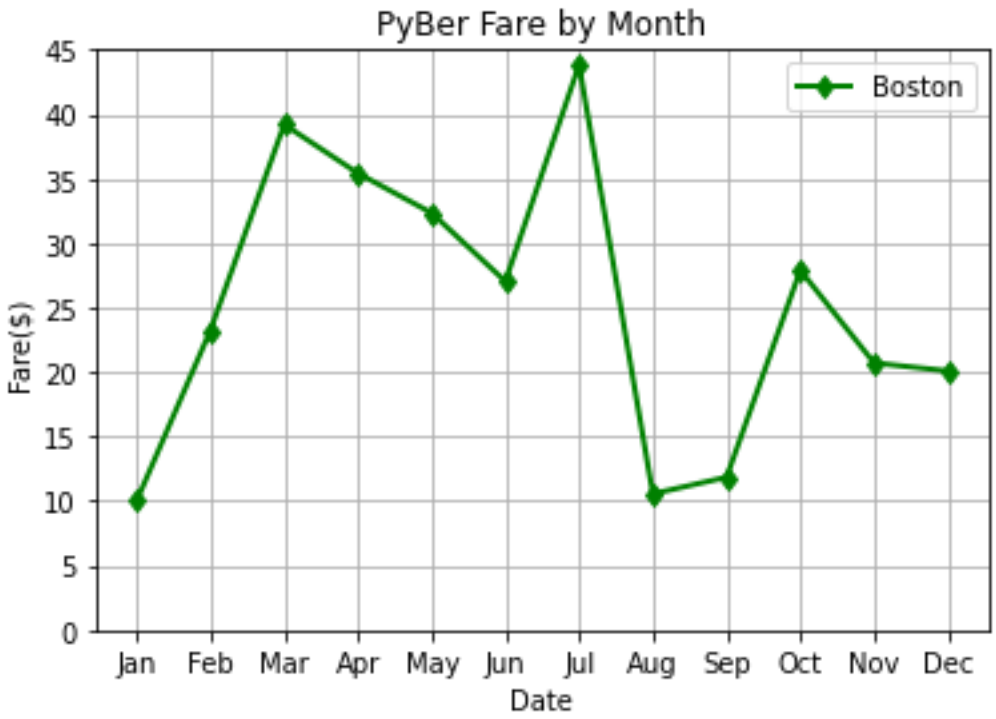


In [33]:

```
# Create the plot and add a label for legend and add color
fig, ax = plt.subplots()
ax.plot(x_axis, y_axis, marker = "d", color = "green", label ="Boston",
linewidth=2)

# Create labels for x and y axis
ax.set_xlabel("Date")
ax.set_ylabel("Fare($)")

#Set the y limit  between 0 and 45
ax.set_ylim(0,45)

#Create title
ax.set_title("PyBer Fare by Month")

#Add a grid
ax.grid()

#Add legend
ax.legend()
```

Out[33]:

```
<matplotlib.legend.Legend at 0x240fb702670>
```



In [34]:

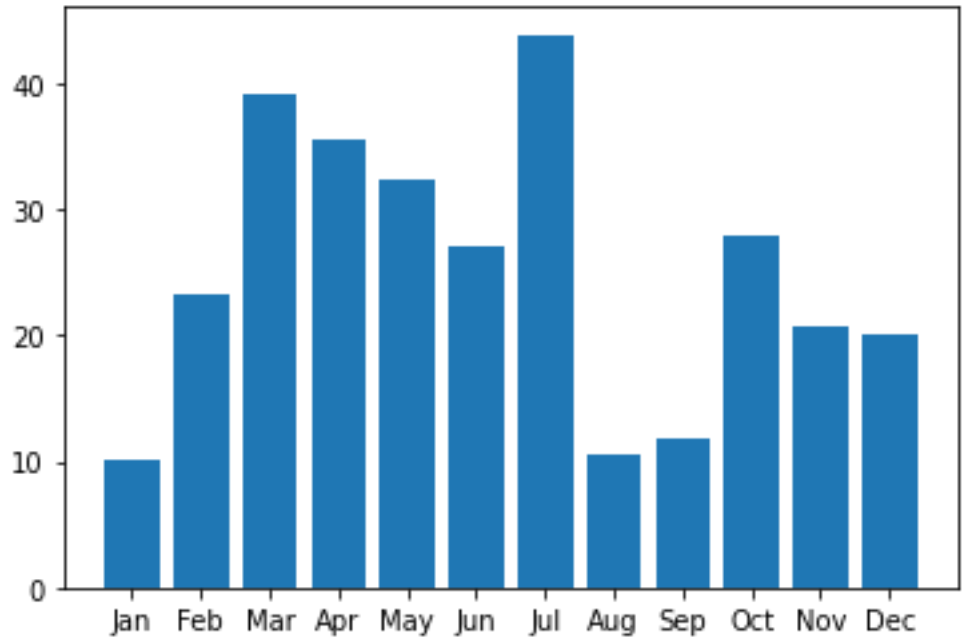
```
#Set the x-axis to alist of strings for each month
x_axis = ["Jan", "Feb",
"Mar","Apr","May","Jun","Jul","Aug","Sep","Oct","Nov","Dec"]
y_axis =
[10.02,23.24,39.20,35.42,32.34,27.04,43.82,10.56,11.85,27.90,20.71,20.09 ]
```

In [35]:

```
# Create the plot
plt.bar(x_axis, y_axis)
```

Out[35]:

```
<BarContainer object of 12 artists>
```

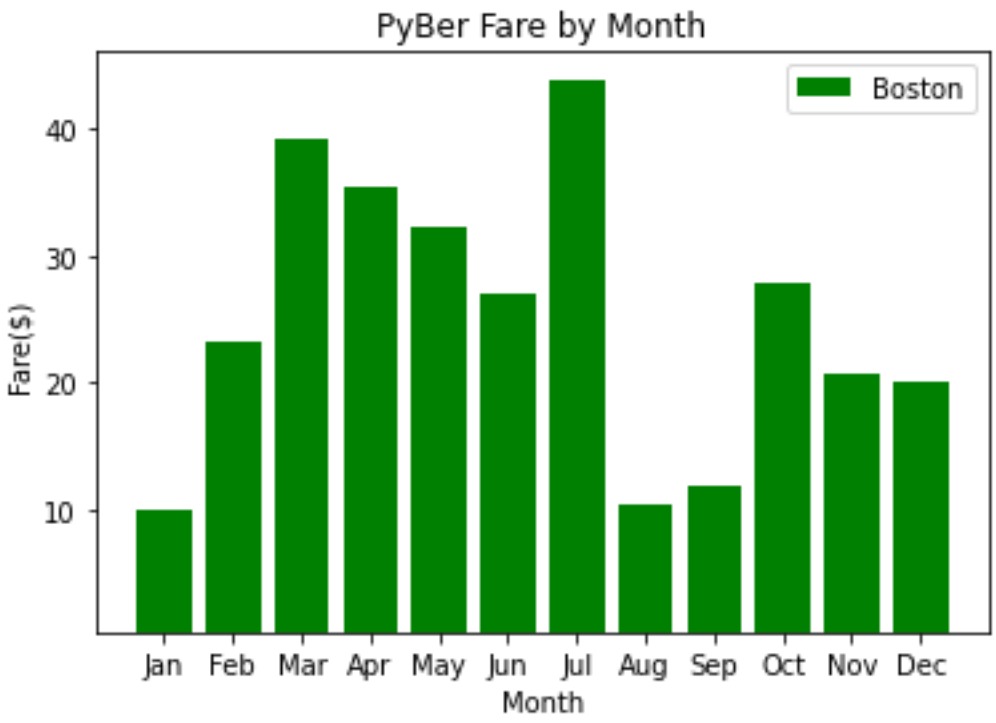


In [37]:

```
# Create the plot
plt.bar(x_axis, y_axis, color = "green", label = "Boston")

plt.xlabel("Month")
plt.ylabel("Fare($)")

plt.ylim(0.45)
plt.title("PyBer Fare by Month")
plt.legend()
```

Out[37]:

```
<matplotlib.legend.Legend at 0x240fb6e74c0>
```

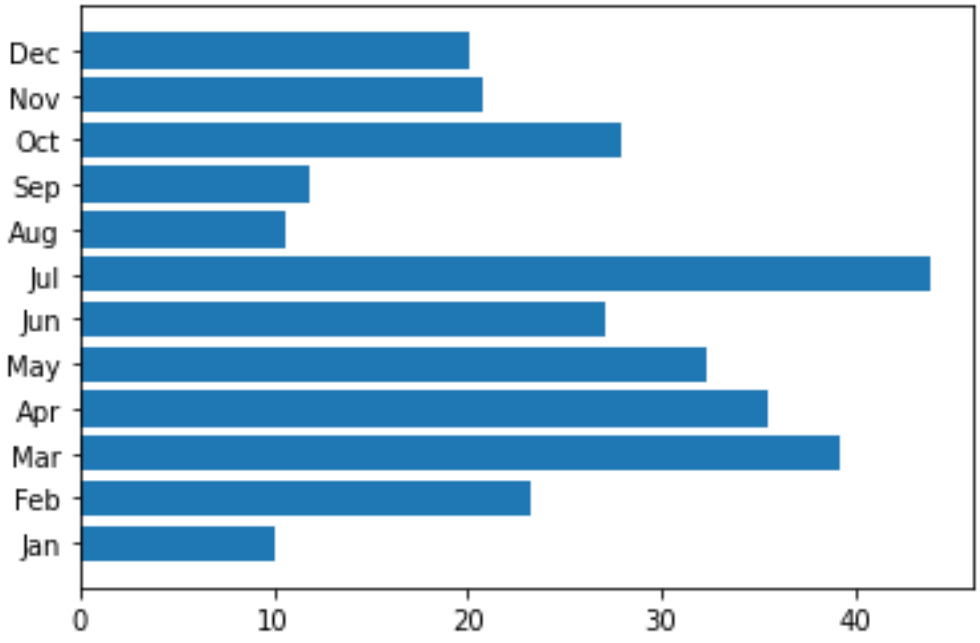


In [38]:

```
# Create the plot
plt.barh(x_axis, y_axis)
```

Out[38]:

```
<BarContainer object of 12 artists>
```

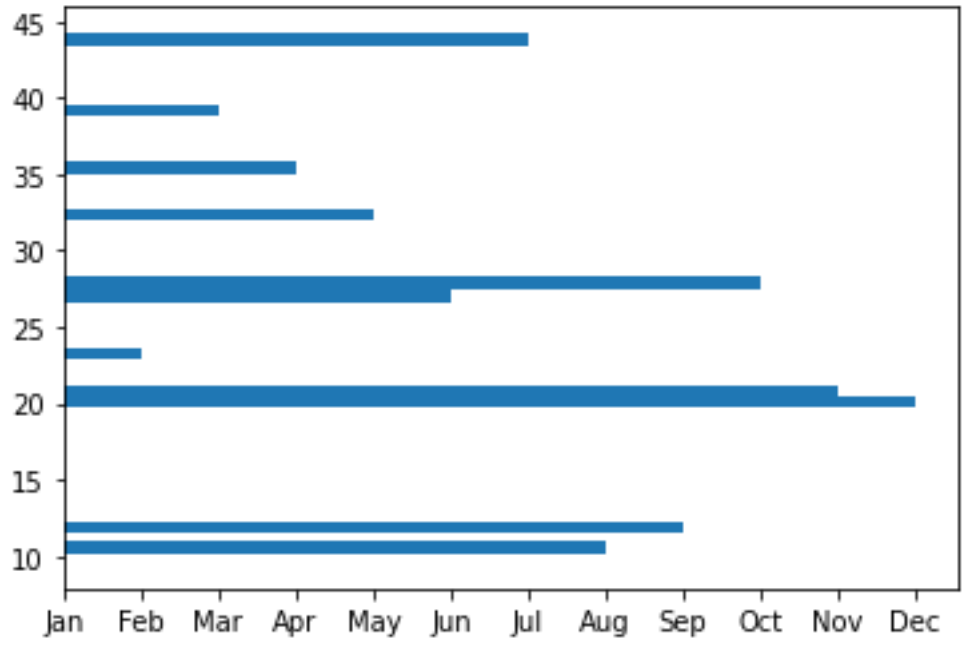


In [39]:

```
plt.barh(y_axis, x_axis)
```

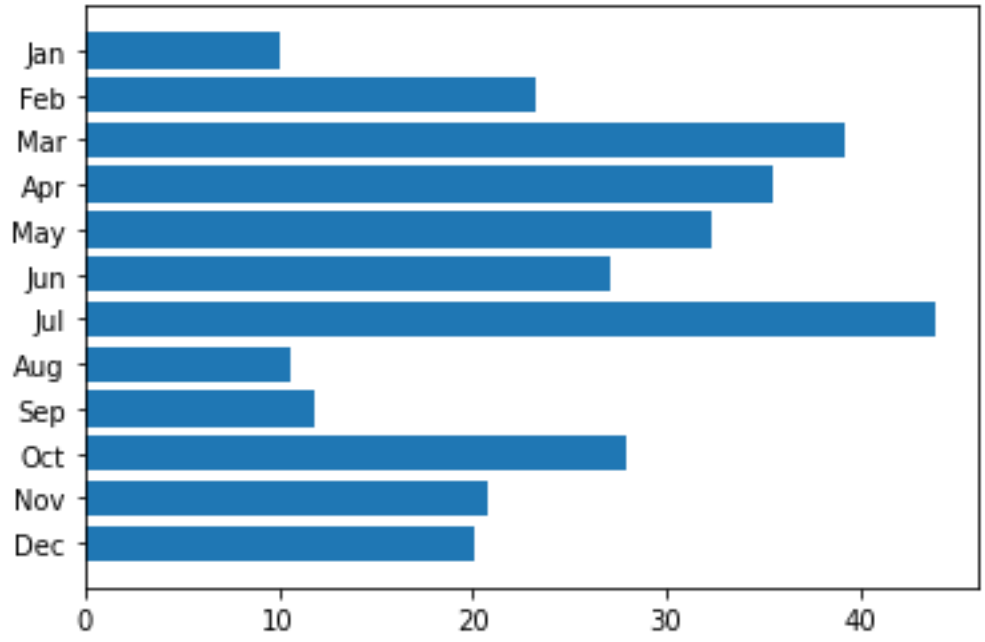
Out[39]:

```
<BarContainer object of 12 artists>
```



In [40]:

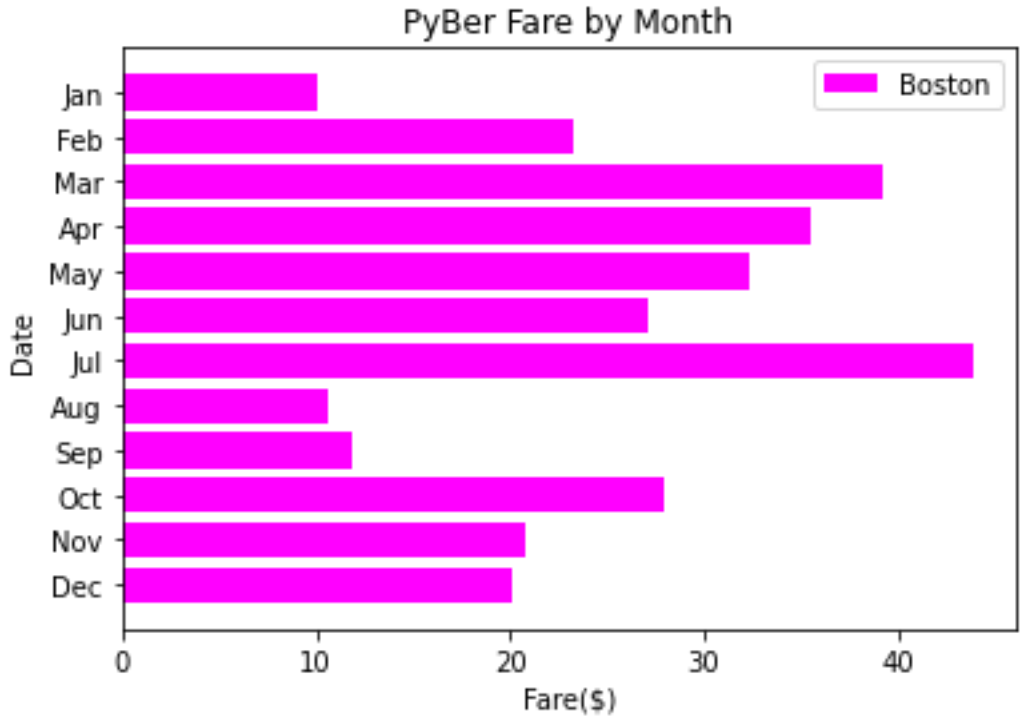
```
# Create the plot.
plt.barh(x_axis, y_axis)
plt.gca().invert_yaxis()
```



In [42]:

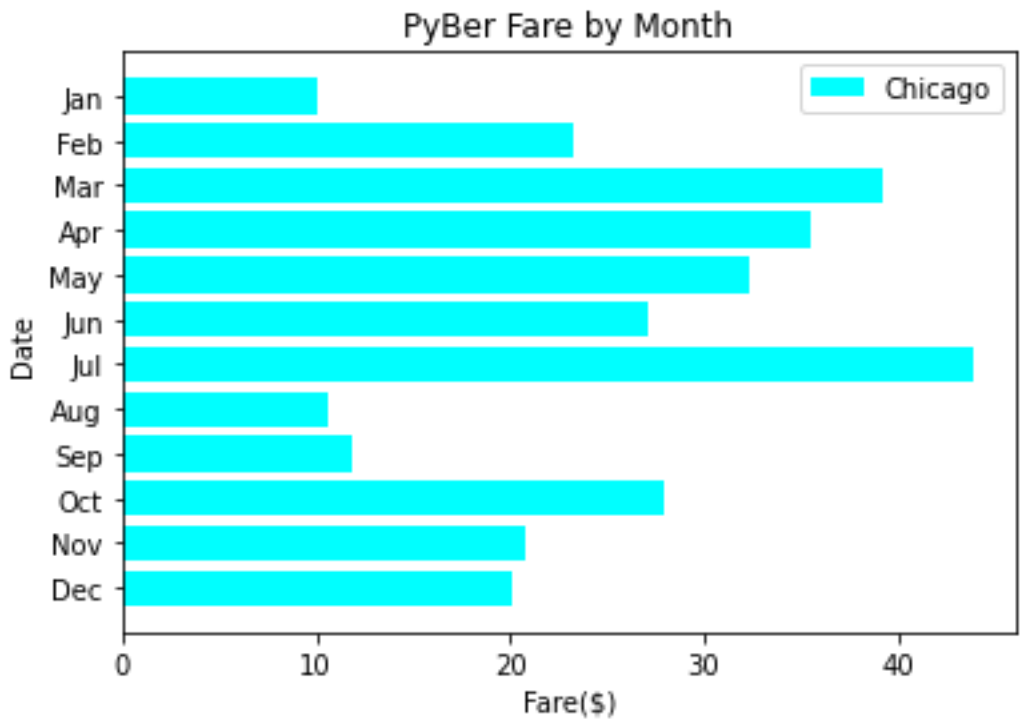
```
plt.barh(x_axis, y_axis, color = "magenta", label = "Boston")
plt.title("PyBer Fare by Month")
plt.xlabel("Fare($)")
plt.ylabel("Date")
plt.legend()
```

```
plt.gca().invert_yaxis()
```



In [48]:

```
fig, ax = plt.subplots()

ax.barh(x_axis, y_axis, color = "cyan", label = "Chicago" )
ax.set_xlabel("Fare($)")
ax.set_ylabel("Date")
ax.set_title("PyBer Fare by Month")
ax.legend()
ax.invert_yaxis()
```



In [1]:

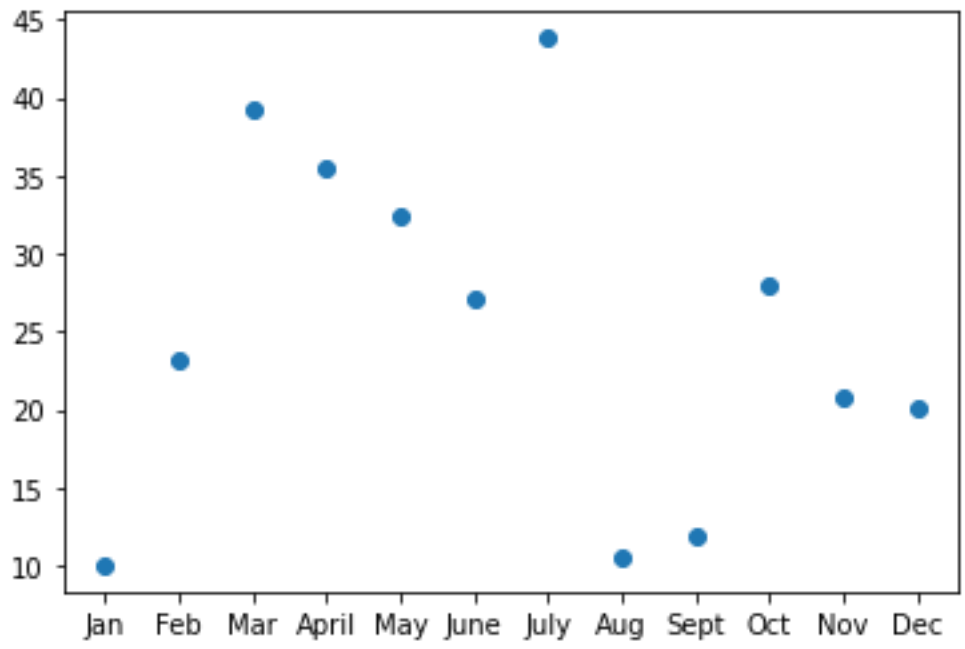
```
# Set the x-axis to a list of strings for each month.
x_axis = ["Jan", "Feb", "Mar", "April", "May", "June", "July", "Aug", "Sept",
"Oct", "Nov", "Dec"]

# Set the y-axis to a list of floats as the total fare in US dollars
accumulated for each month.
y_axis = [10.02, 23.24, 39.20, 35.42, 32.34, 27.04, 43.82, 10.56, 11.85,
27.90, 20.71, 20.09]
```

In [6]:

```
plt.plot(x_axis, y_axis, "o")
```

Out[6]:

```
[<matplotlib.lines.Line2D at 0x1f61a6988b0>]
```

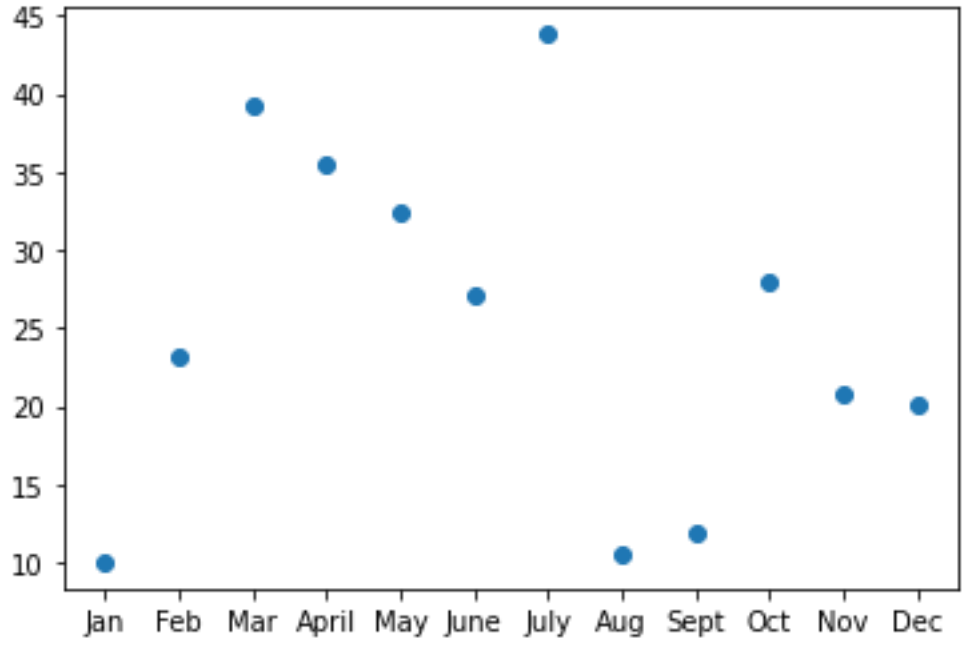


In [7]:

```
plt.scatter(x_axis, y_axis)
```

Out[7]:

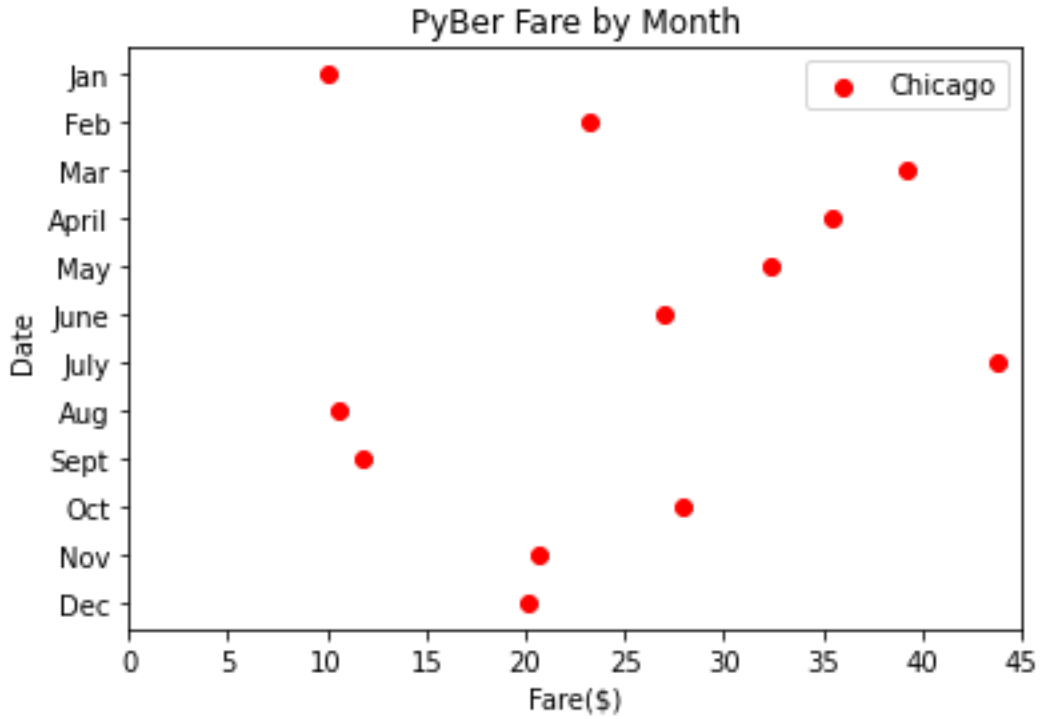
```
<matplotlib.collections.PathCollection at 0x1f61a707eb0>
```



In [8]:

```
plt.scatter(y_axis, x_axis, c="red", label = "Chicago")
plt.ylabel("Date")
plt.xlabel("Fare($)")
plt.xlim(0,45)
plt.title("PyBer Fare by Month")
plt.legend()
```

```
plt.gca().invert_yaxis()
```

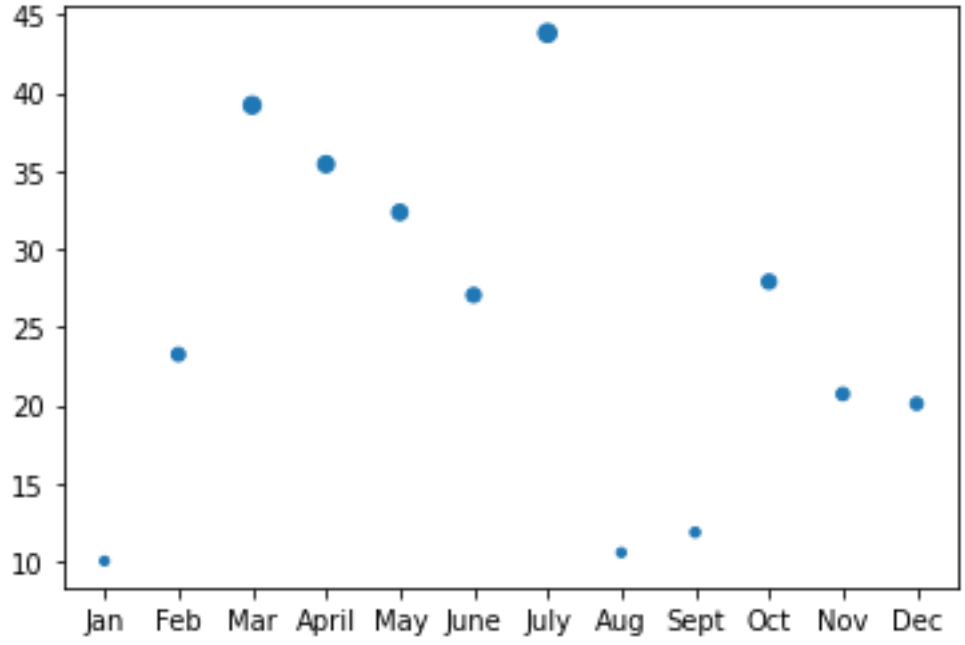


In [10]:

```
plt.scatter(x_axis, y_axis, s=y_axis)
```

Out[10]:

```
<matplotlib.collections.PathCollection at 0x1f61a892520>
```



In [11]:

```
y_axis_larger = []
for data in y_axis:
```

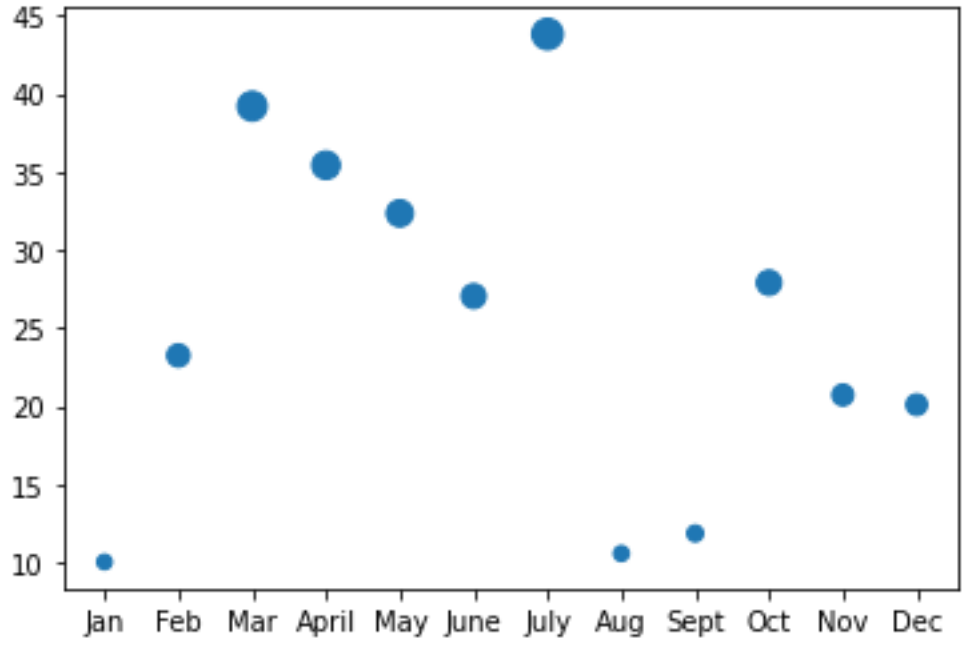
```
    y_axis_larger.append(data*3)
```

In [12]:

```
plt.scatter(x_axis, y_axis, s=y_axis_larger)
```

Out[12]:

```
<matplotlib.collections.PathCollection at 0x1f61a905c40>
```

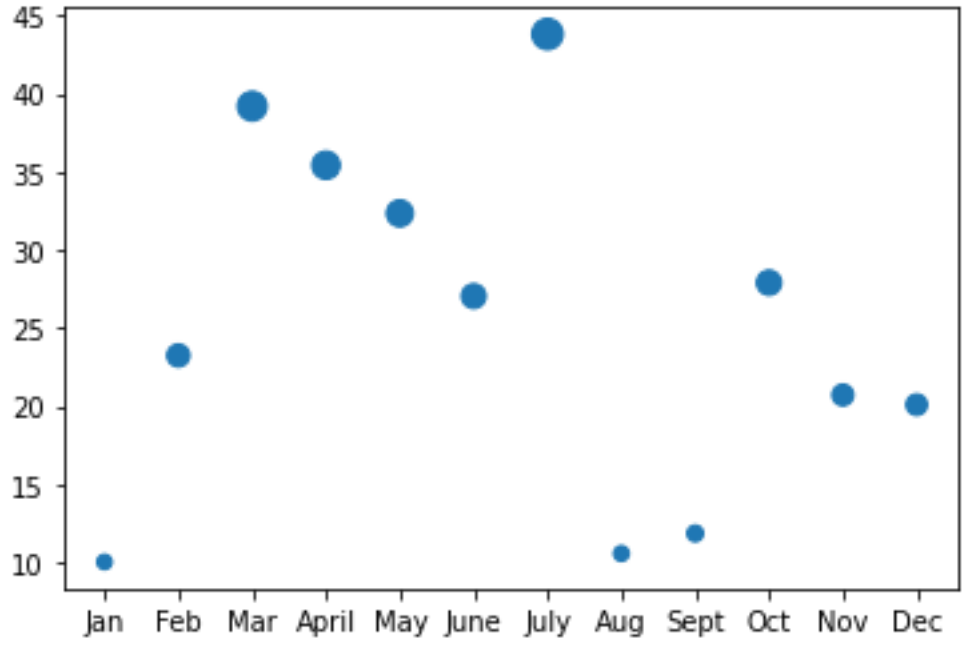


In [14]:

```
plt.scatter(x_axis, y_axis, s = [i * 3 for i in y_axis])
```

Out[14]:

```
<matplotlib.collections.PathCollection at 0x1f61a9843d0>
```

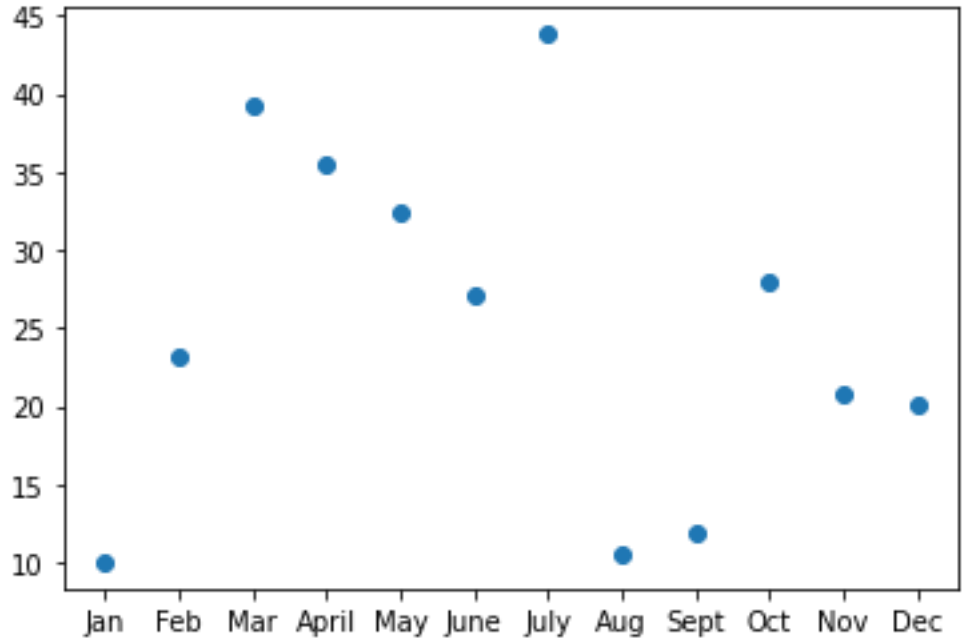


In [15]:

```
#object oriented method

fig, ax = plt.subplots()
ax.scatter(x_axis, y_axis)
```

Out[15]:

```
<matplotlib.collections.PathCollection at 0x1f61a91df70>
```

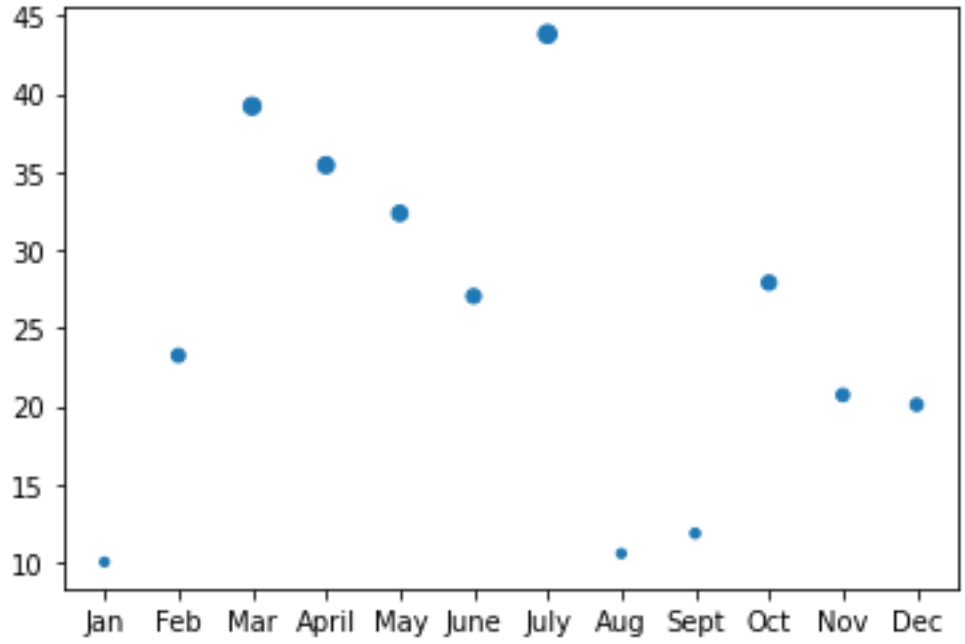


In [17]:

```
fig, ax = plt.subplots()
ax.scatter(x_axis, y_axis, s= y_axis)
```

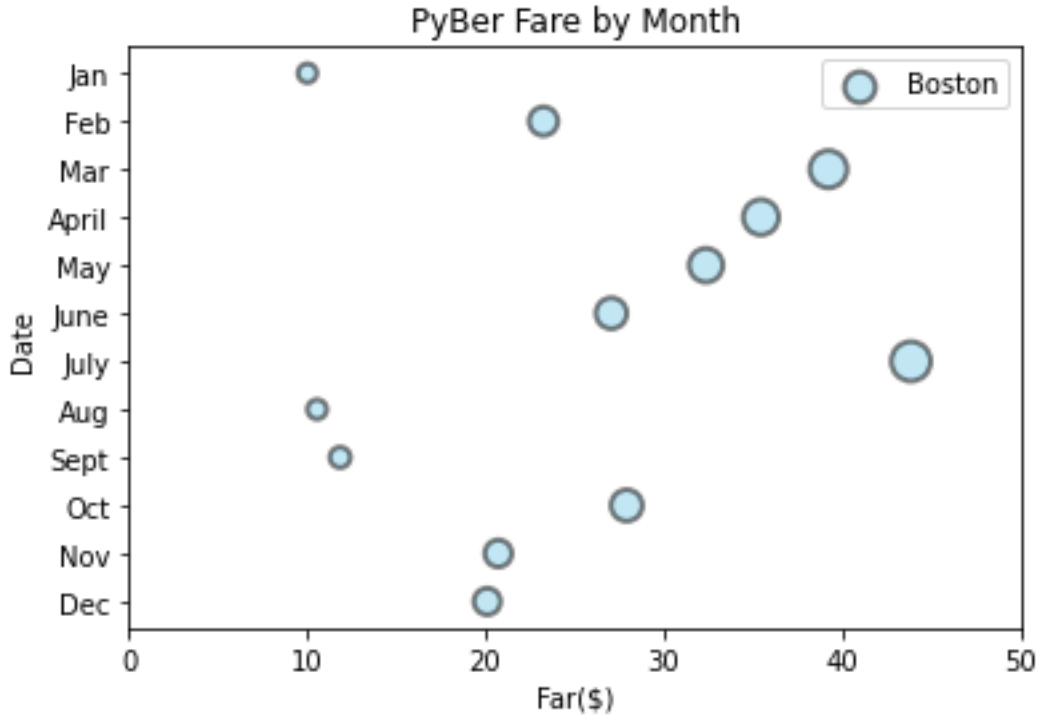
Out[17]:

```
<matplotlib.collections.PathCollection at 0x1f61aa6f7f0>
```



In [30]:

```
fig, ax = plt.subplots()
ax.scatter(y_axis, x_axis,color = "skyblue", alpha = 0.5,edgecolor = "black"
,s = [i * 5 for i in y_axis], linewidth = 2, label = "Boston")
ax.legend()
ax.set_title("PyBer Fare by Month")
ax.set_xlim(0,50)
ax.set_ylabel("Date")
ax.set_xlabel("Far($)")
ax.invert_yaxis()
```



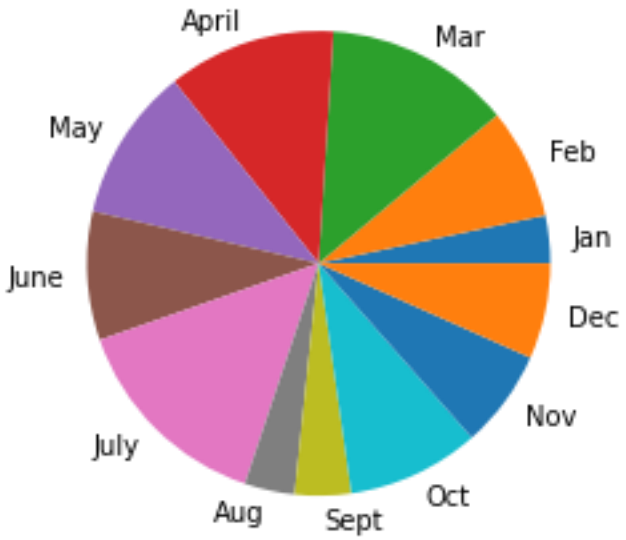
In [32]:

```
plt.pie(y_axis, labels = x_axis)
```

Out[32]:

```
([<matplotlib.patches.Wedge at 0x1f61c1a0310>,
  <matplotlib.patches.Wedge at 0x1f61c1a07f0>,
  <matplotlib.patches.Wedge at 0x1f61bfb1700>,
  <matplotlib.patches.Wedge at 0x1f61c1ad0a0>,
  <matplotlib.patches.Wedge at 0x1f61c1ad580>,
  <matplotlib.patches.Wedge at 0x1f61c1ada60>,
  <matplotlib.patches.Wedge at 0x1f61c1adf40>,
  <matplotlib.patches.Wedge at 0x1f61c1ba460>,
  <matplotlib.patches.Wedge at 0x1f61c1ba940>,
  <matplotlib.patches.Wedge at 0x1f61c1bae20>,
  <matplotlib.patches.Wedge at 0x1f61c1a02e0>,
  <matplotlib.patches.Wedge at 0x1f61c1c9820>],
 [Text(1.0940372721655667, 0.11437852557419124, 'Jan'),
  Text(0.9905193092273052, 0.4784051609753622, 'Feb'),
  Text(0.4998632656180861, 0.9798656620606842, 'Mar'),
  Text(-0.3293082697128627, 1.0495504101750999, 'April'),
```

```
  Text(-0.9306200792045569, 0.5864693241605263, 'May'),
  Text(-1.0983369533258995, -0.06046434452452758, 'June'),
  Text(-0.7729302540020312, -0.782674148319948, 'July'),
  Text(-0.2333875250754619, -1.0749559354406817, 'Aug'),
  Text(0.021097559209412746, -1.099797660024518, 'Sept'),
  Text(0.4609812999807629, -0.9987473359504124, 'Oct'),
  Text(0.8868706338501641, -0.6507384104340302, 'Nov'),
  Text(1.0760953148482877, -0.22807646384834376, 'Dec')])
```



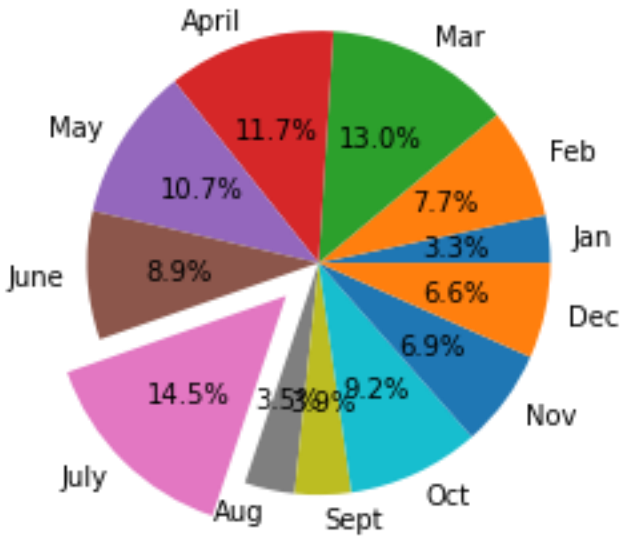
In [38]:

```
explode_values =(0,0,0,0,0,0,0.2,0,0,0,0,0)
plt.pie(y_axis, labels = x_axis, explode= explode_values, autopct = "%.1f%%")
```

Out[38]:

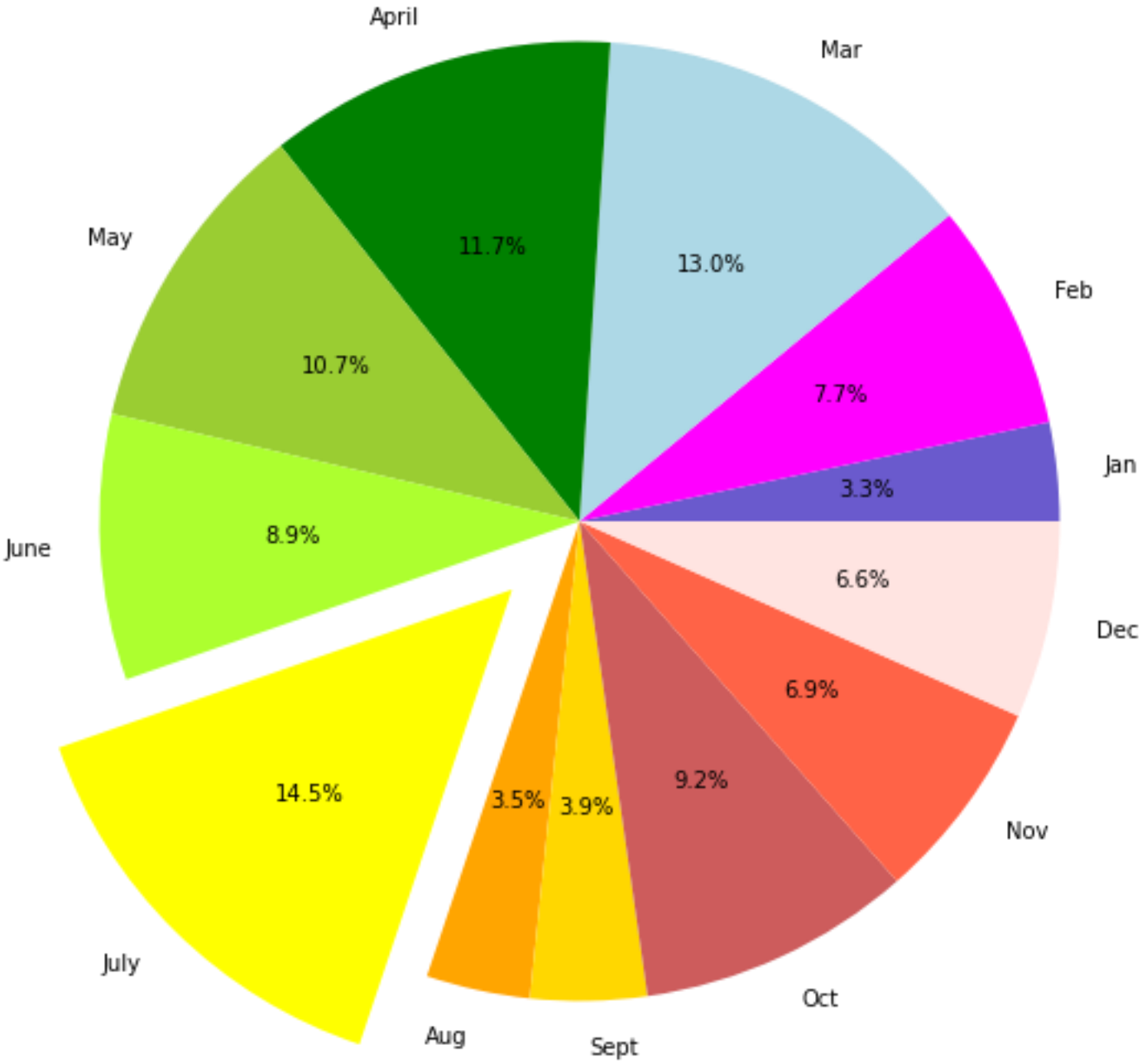
```
([<matplotlib.patches.Wedge at 0x1f61bc07040>,
  <matplotlib.patches.Wedge at 0x1f61bcb7250>,
  <matplotlib.patches.Wedge at 0x1f61bcb7fd0>,
  <matplotlib.patches.Wedge at 0x1f61bcc4550>,
  <matplotlib.patches.Wedge at 0x1f61bcc4160>,
  <matplotlib.patches.Wedge at 0x1f61bcbf9a0>,
  <matplotlib.patches.Wedge at 0x1f61bcbf520>,
  <matplotlib.patches.Wedge at 0x1f61bc9ba60>,
  <matplotlib.patches.Wedge at 0x1f61bc9b610>,
  <matplotlib.patches.Wedge at 0x1f61bc00ac0>,
  <matplotlib.patches.Wedge at 0x1f61bc070d0>,
  <matplotlib.patches.Wedge at 0x1f61bc95c40>],
 [Text(1.0940372721655667, 0.11437852557419124, 'Jan'),
  Text(0.9905193092273052, 0.4784051609753622, 'Feb'),
  Text(0.4998632656180861, 0.9798656620606842, 'Mar'),
  Text(-0.3293082697128627, 1.0495504101750999, 'April'),
  Text(-0.9306200792045569, 0.5864693241605263, 'May'),
  Text(-1.0983369533258995, -0.06046434452452758, 'June'),
  Text(-0.913463027456946, -0.9249785389235748, 'July'),
  Text(-0.2333875250754619, -1.0749559354406817, 'Aug'),
  Text(0.021097559209412746, -1.099797660024518, 'Sept'),
```

```
 Text(0.4609812999807629, -0.9987473359504124, 'Oct'),
 Text(0.8868706338501641, -0.6507384104340302, 'Nov'),
 Text(1.0760953148482877, -0.22807646384834376, 'Dec')],
[Text(0.5967476029993999, 0.06238828667683158, '3.3%'),
 Text(0.5402832595785301, 0.2609482696229248, '7.7%'),
 Text(0.27265269033713785, 0.5344721793058277, '13.0%'),
 Text(-0.17962269257065236, 0.5724820419136908, '11.7%'),
 Text(-0.5076109522933946, 0.3198923586330143, '10.7%'),
 Text(-0.5990928836323088, -0.03298055155883322, '8.9%'),
 Text(-0.562131093819659, -0.5692175624145076, '14.5%'),
 Text(-0.12730228640479738, -0.5863396011494626, '3.5%'),
 Text(0.011507759568770587, -0.5998896327406462, '3.9%'),
 Text(0.2514443454440525, -0.5447712741547703, '9.2%'),
 Text(0.4837476184637258, -0.35494822387310737, '6.9%'),
 Text(0.5869610808263387, -0.12440534391727841, '6.6%')])
```



In [40]:

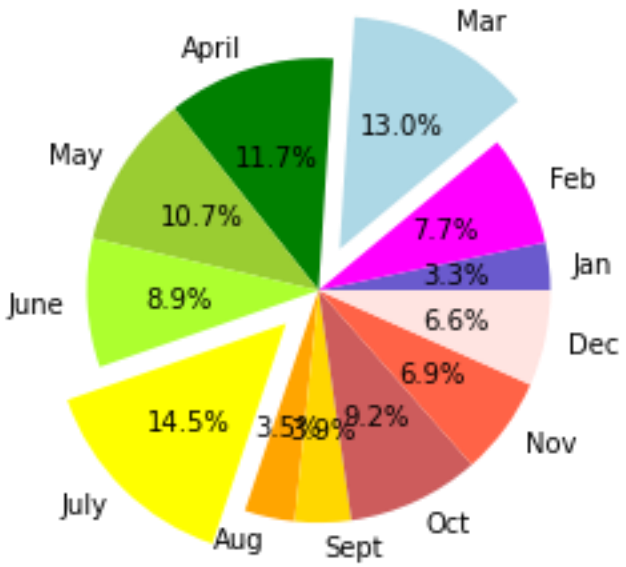
```
# Assign 12 colors, one for each month.
colors = ["slateblue", "magenta", "lightblue", "green", "yellowgreen",
"greenyellow", "yellow", "orange", "gold", "indianred", "tomato",
"mistyrose"]
explode_values = (0, 0, 0, 0, 0, 0, 0.2, 0, 0, 0, 0, 0)
plt.subplots(figsize=(10,10))
plt.pie(y_axis, labels = x_axis, explode= explode_values, colors = colors,
autopct = "%.1f%%")
plt.show()
```



In [52]:

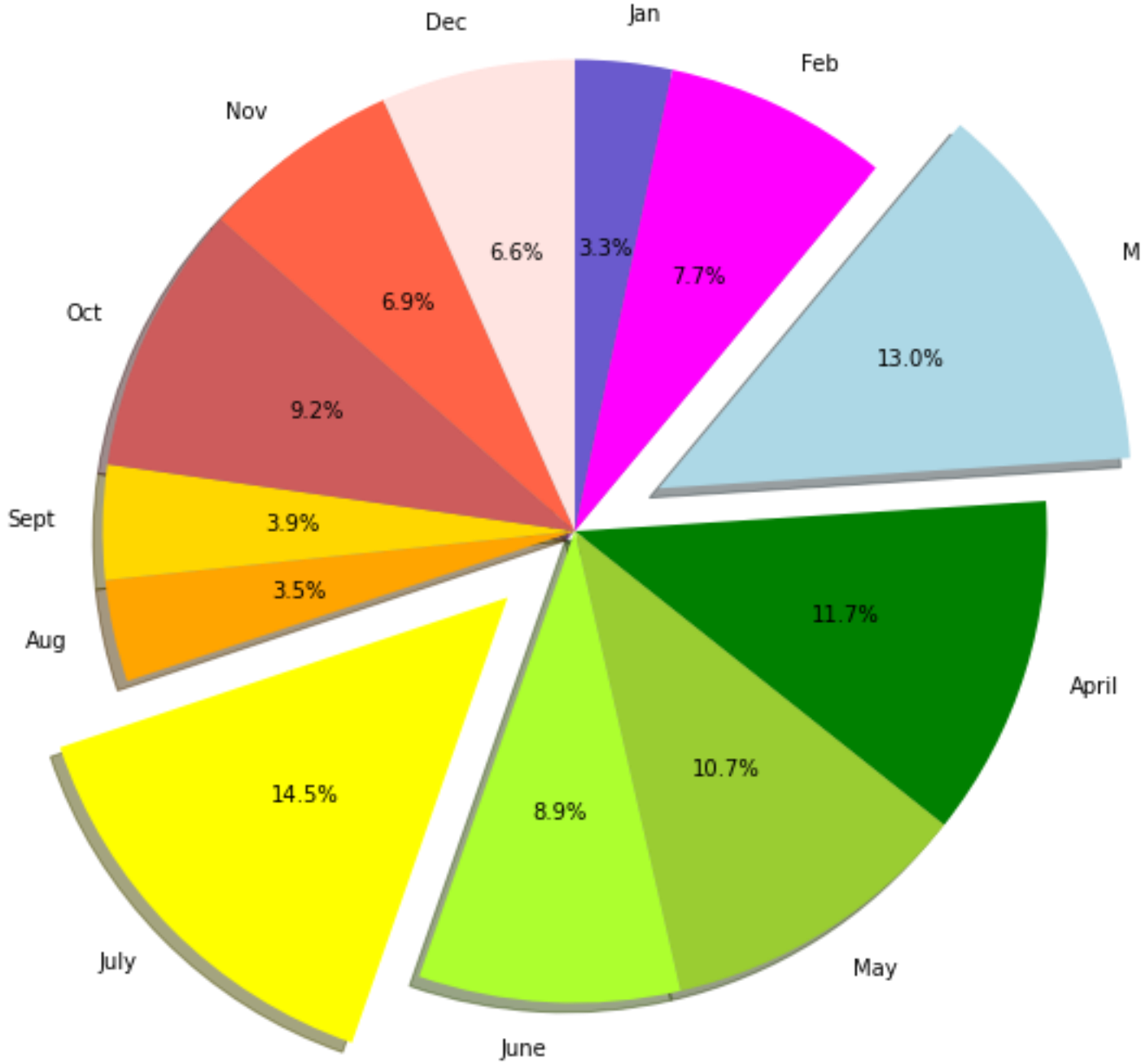
```
# object oriented way
# Set the x-axis to a list of strings for each month.
x_axis = ["Jan", "Feb", "Mar", "April", "May", "June", "July", "Aug", "Sept",
"Oct", "Nov", "Dec"]
```

```
# Set the y-axis to a list of floats as the total fare in US dollars
accumulated for each month.
y_axis = [10.02, 23.24, 39.20, 35.42, 32.34, 27.04, 43.82, 10.56, 11.85,
27.90, 20.71, 20.09]
colors = ["slateblue", "magenta", "lightblue", "green", "yellowgreen",
"greenyellow", "yellow", "orange", "gold", "indianred", "tomato",
"mistyrose"]
explode_values = (0, 0, 0.2, 0, 0, 0, 0.2, 0, 0, 0, 0, 0)
fig, ax = plt.subplots()
ax.pie(y_axis, labels = x_axis, explode= explode_values, colors = colors,
autopct = "%.1f%%")

plt.show()
```



In [64]:

```
# object oriented way
# Set the x-axis to a list of strings for each month.
x_axis = ["Jan", "Feb", "Mar", "April", "May", "June", "July", "Aug", "Sept",
"Oct", "Nov", "Dec"]

# Set the y-axis to a list of floats as the total fare in US dollars
accumulated for each month.
y_axis = [10.02, 23.24, 39.20, 35.42, 32.34, 27.04, 43.82, 10.56, 11.85,
27.90, 20.71, 20.09]
colors = ["slateblue", "magenta", "lightblue", "green", "yellowgreen",
"greenyellow", "yellow", "orange", "gold", "indianred", "tomato",
"mistyrose"]
explode_values = (0, 0, 0.2, 0, 0, 0, 0.2, 0, 0, 0, 0, 0)
fig, ax = plt.subplots(figsize=(10, 10))
ax.pie(y_axis, labels = x_axis, explode= explode_values, colors = colors,
autopct = "%.1f%%",shadow = True, counterclock=False, startangle=90)

plt.show()
```



In [1]:

```
%matplotlib inline
```

In [2]:

```
# Import dependencies.
import matplotlib.pyplot as plt
import statistics
```

In [3]:

```
# Set the x-axis to a list of strings for each month.
x_axis = ["Jan", "Feb", "Mar", "April", "May", "June", "July", "Aug", "Sept",
"Oct", "Nov", "Dec"]

# Set the y-axis to a list of floats as the total fare in US dollars
accumulated for each month.
y_axis = [10.02, 23.24, 39.20, 35.42, 32.34, 27.04, 43.82, 10.56, 11.85,
27.90, 20.71, 20.09]
```

In [5]:

```
# Get the standard deviation of the values in the y-axis.
stdev = statistics.stdev(y_axis)
stdev
```

Out[5]:

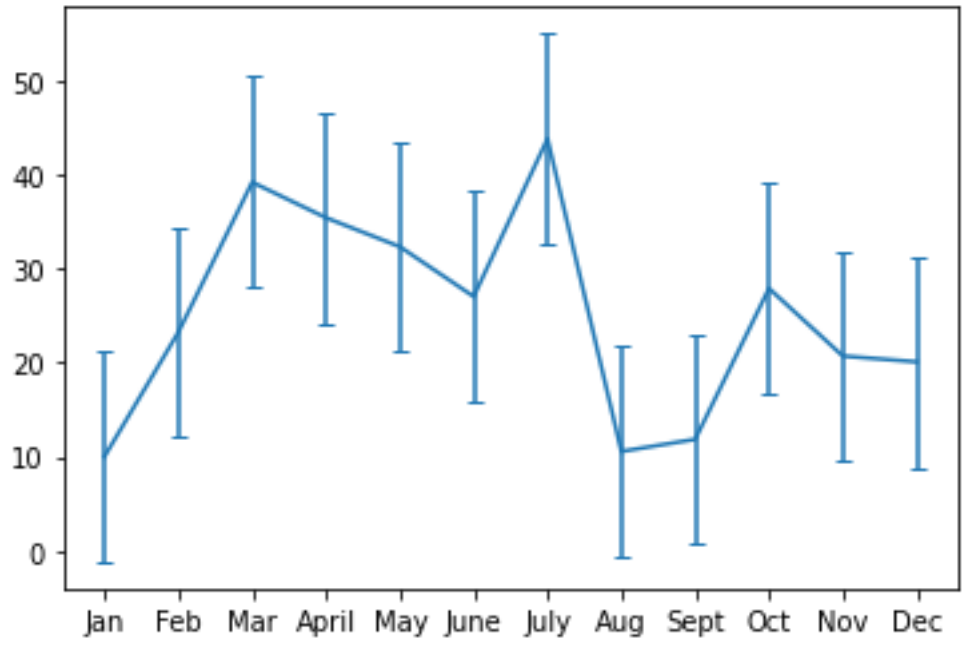
```
11.208367917035753
```

In [70]:

```
plt.errorbar(x_axis, y_axis, yerr=stdev, capsize=3)
```

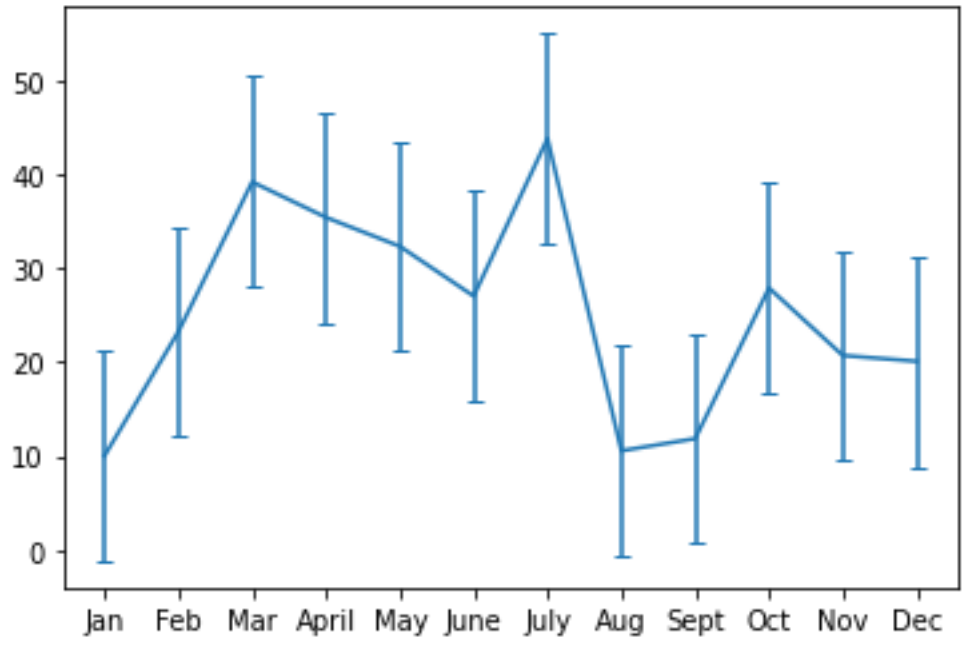
Out[70]:

```
<ErrorbarContainer object of 3 artists>
```



In [71]:

```
fig, ax = plt.subplots()
ax.errorbar(x_axis, y_axis, yerr=stdev, capsize=3)
plt.show()
```

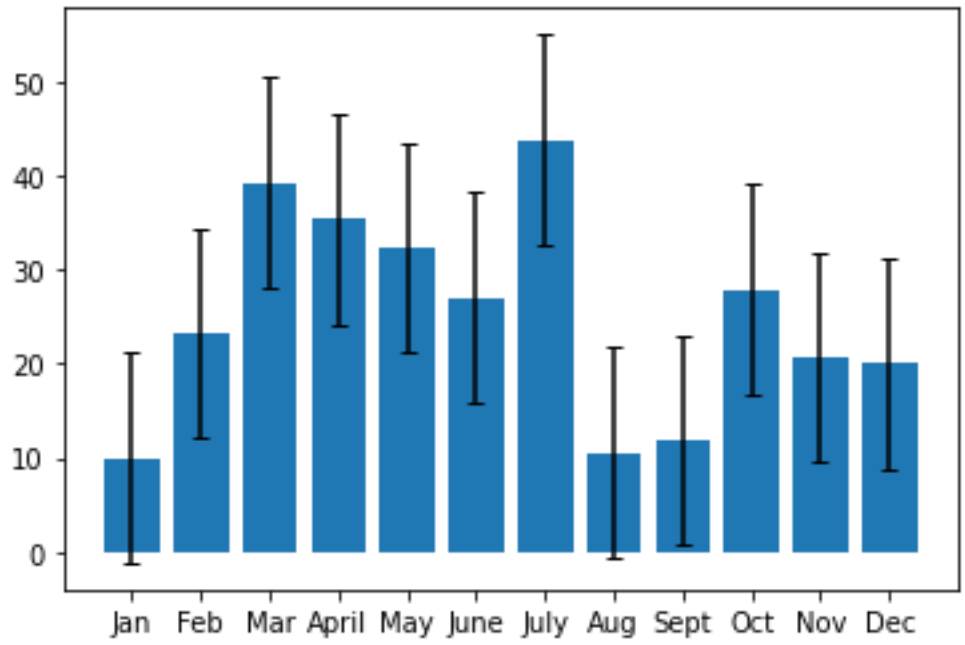


In [72]:

```
plt.bar(x_axis, y_axis, yerr=stdev, capsize=3)
```

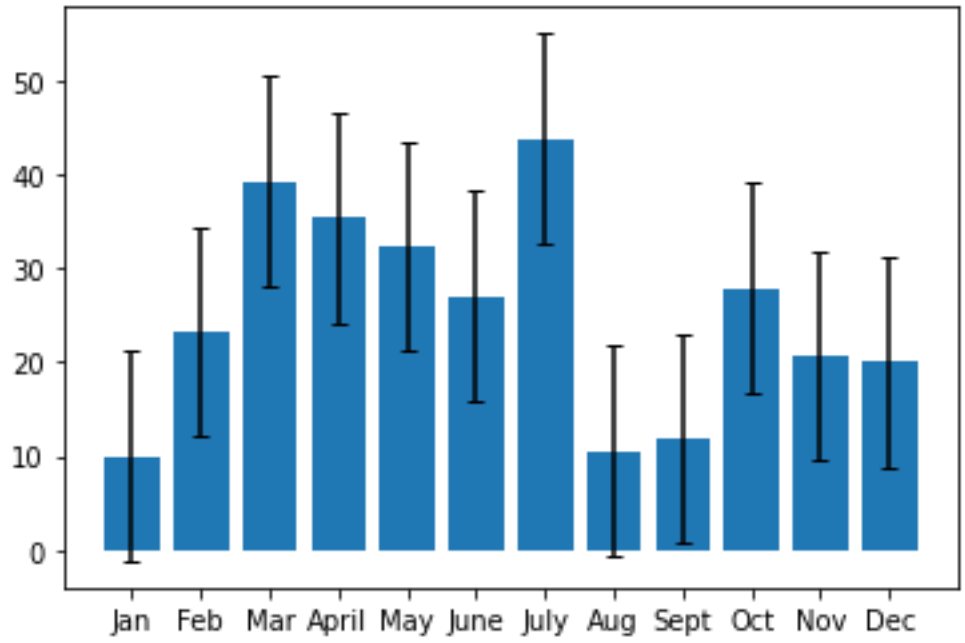
Out[72]:

```
<BarContainer object of 12 artists>
```



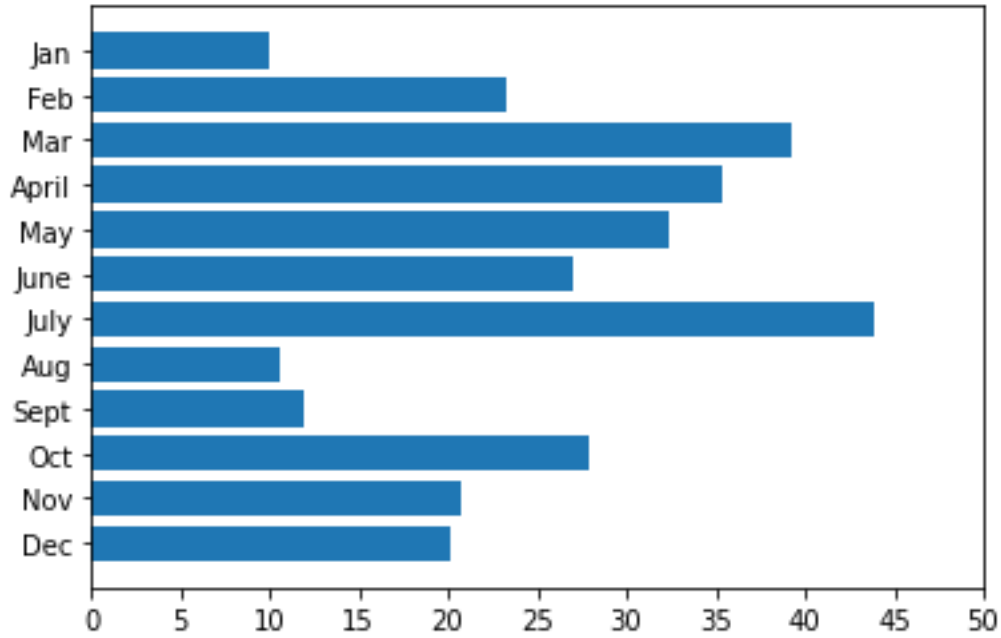
In [73]:

```
fig, ax = plt.subplots()
ax.bar(x_axis, y_axis, yerr=stdev, capsize=3)
plt.show()
```



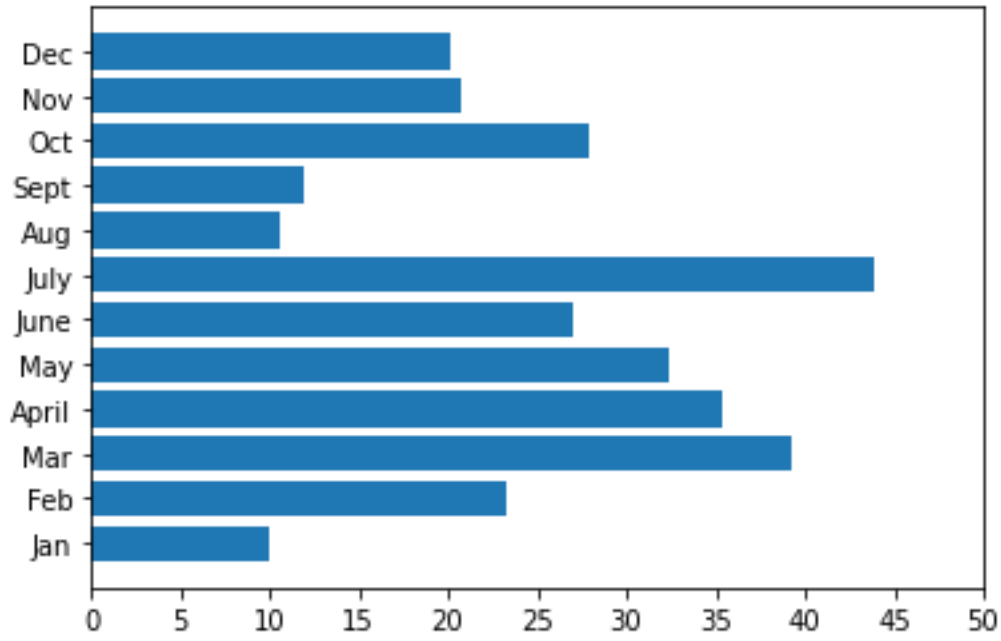
In [74]:

```
import numpy as np
plt.barh(x_axis, y_axis)
plt.xticks(np.arange(0, 51, step=5.0))
plt.gca().invert_yaxis()
```



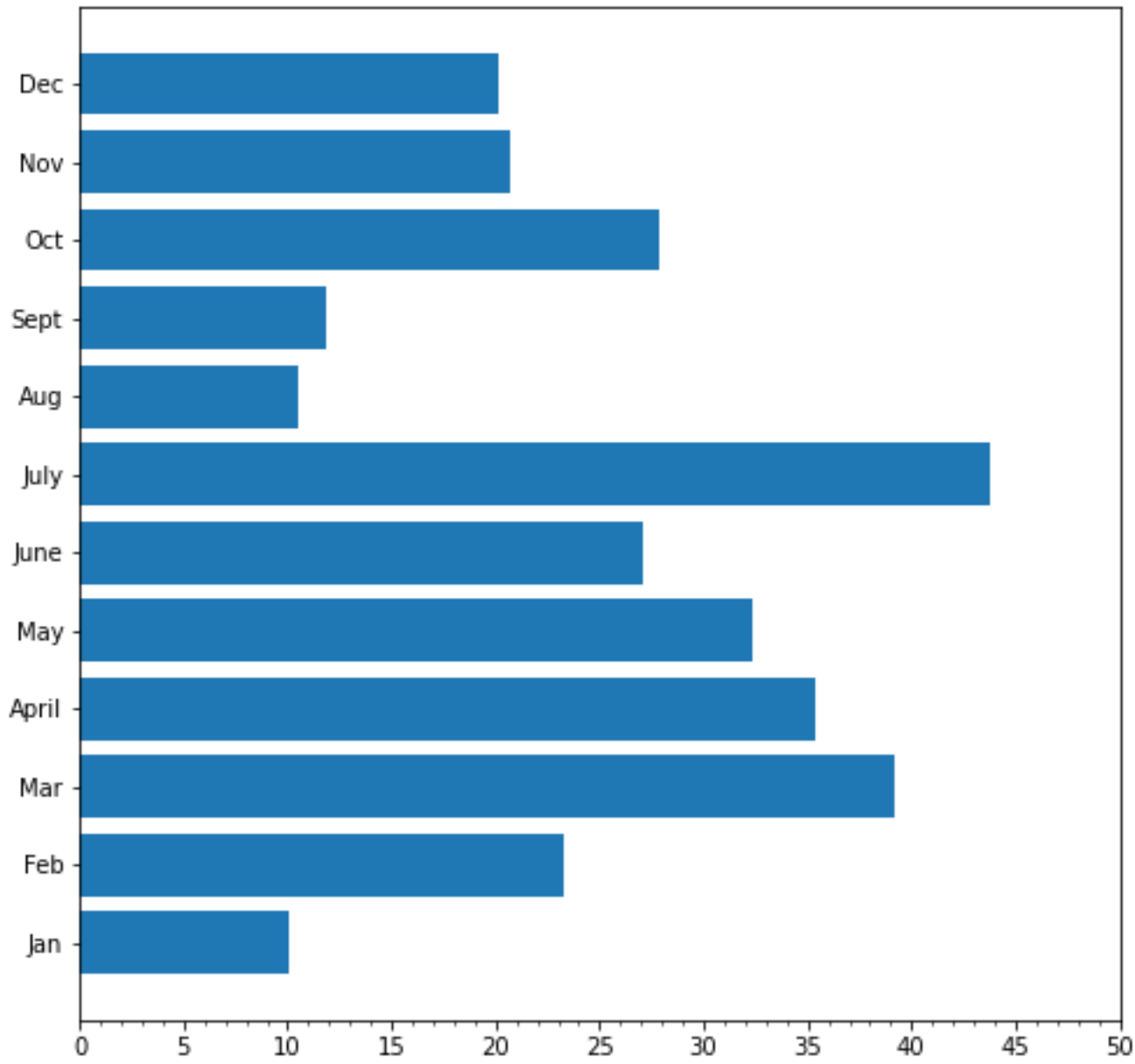
In [75]:

```
fig, ax = plt.subplots()
ax.barh(x_axis, y_axis)
ax.set_xticks(np.arange(0, 51, step=5.0))
plt.show()
```



In [76]:

```
from matplotlib.ticker import MultipleLocator
# Increase the size of the plot figure.
fig, ax = plt.subplots(figsize=(8, 8))
ax.barh(x_axis, y_axis)
ax.set_xticks(np.arange(0, 51, step=5.0))

# Create minor ticks at an increment of 1.
ax.xaxis.set_minor_locator(MultipleLocator(1))
plt.show()
```


Dec
Nov
Oct
Sept
Aug
July
June
May
April
Mar
Feb
Jan
0
5
10
15
20
25
30
35
40
45
50

In [ ]: