In [1]:
```
%matplotlib inline
# Dependencies and Setup
import pandas as pd
import matplotlib.pyplot as plt
```

In [2]:
```
# Read the csv files into pandas as dataframes
data_file = "data/city_data.csv"
city_df = pd.read_csv(data_file)
data_file2 = "data/ride_data.csv"
ride_df = pd.read_csv(data_file2)
city_df.head()
```

Out[2]:

	city	driver_count	type
0	Richardfort	38	Urban
1	Williamsstad	59	Urban
2	Port Angela	67	Urban
3	Rodneyfort	34	Urban
4	West Robert	39	Urban

In [3]:
```
ride_df.head()
```

Out[3]:

	city	date	fare	ride_id
0	Lake Jonathanshire	2018-01-14 10:14:22	13.83	5739410935873
1	South Michelleport	2018-03-04 18:24:09	30.24	2343912425577
2	Port Samanthamouth	2018-02-24 04:29:00	33.44	2005065760003
3	Rodneyfort	2018-02-10 23:22:03	23.44	5149245426178
4	South Jack	2018-03-06 04:28:35	34.58	3908451377344

In [4]:
```
# Merge dataframes then sort by city
merge_df = pd.merge(city_df,ride_df,on="city",how="outer")
merge_df = merge_df.sort_values("city")
merge_df.head()
```

Out[4]:

	city	driver_count	type	date	fare	ride_id
1523	Amandaburgh	12	Urban	2018-01-11 02:22:07	29.24	7279902884763
1522	Amandaburgh	12	Urban	2018-02-10 20:42:46	36.17	6455620849753
1529	Amandaburgh	12	Urban	2018-03-13 12:52:31	13.88	6222134922674
1524	Amandaburgh	12	Urban	2018-01-21 04:12:54	9.26	5528427024492
1525	Amandaburgh	12	Urban	2018-04-19 16:30:12	6.27	4400632718421

In [5]:
```
# Slice the city_df by Urban city type
city_urban = city_df.loc[city_df["type"]=="Urban"]
city_urban.sort_values("city")
# Driver_count per city for urban city type
drivers_urban = city_urban["driver_count"].tolist()
drivers_urban = [each*5 for each in drivers_urban]
city_urban.head()
```

Out[5]:

	city	driver_count	type
0	Richardfort	38	Urban
1	Williamsstad	59	Urban
2	Port Angela	67	Urban
3	Rodneyfort	34	Urban
4	West Robert	39	Urban

In [6]:
```
# Slice the city_df by Rural city type
city_rural = city_df.loc[city_df["type"]=="Rural"]
city_rural.sort_values("city")
# Driver_count per city by Rural type
drivers_rural = city_rural["driver_count"].tolist()
drivers_rural = [each*5 for each in drivers_rural]
drivers_rural
city_rural.head()
```

Out[6]:

	city	driver_count	type
102	South Jennifer	7	Rural
103	West Heather	4	Rural
104	Newtonview	1	Rural
105	North Holly	8	Rural
106	Michaelberg	6	Rural

In [7]:
```
# Slice the city_df by suburban city type
city_sub = city_df.loc[city_df["type"]=="Suburban"]
city_sub.sort_values("city")
# Driver_count per city by suburban type
drivers_sub= city_sub["driver_count"].tolist()
drivers_sub = [each*5 for each in drivers_sub]
city_sub.head()
```

Out[7]:

	city	driver_count	type
66	Port Shane	7	Suburban
67	Lake Ann	3	Suburban
68	Lake Scott	23	Suburban
69	Colemanland	23	Suburban
70	New Raymond	17	Suburban

In [8]:

```
# Slice merged df by urban type
urban_df = merge_df.loc[merge_df["type"]=="Urban"]
urban_df.sort_values("city")
# Groupby city
group_urban = urban_df.groupby("city")
# Number of rides per city-Urban
rides_city_urban = group_urban["type"].count()
rides_city_urban
# Average fare per city-Urban
avgfare_urban = round(group_urban["fare"].mean(),2)
avgfare_urban
```

Out[8]:
```
city
Amandaburgh               24.64
Barajasview               25.33
Carriemouth               28.31
Christopherfurt           24.50
Deanville                 25.84
East Kaylahaven           23.76
Erikaland                 24.91
Grahamburgh               25.22
Huntermouth               28.99
Hurleymouth               25.89
Jerryton                  25.65
Johnton                   26.79
Joneschester              22.29
Justinberg                23.69
Karenberg                 26.34
Karenside                 27.45
Lake Danielberg           24.84
Lake Jonathanshire        23.43
Lake Scottton             23.81
Leahton                   21.24
Liumouth                  26.15
Loganberg                 25.29
Martinezhaven             22.65
New Jacobville            26.77
New Kimberlyborough       22.59
New Paulton               27.82
New Paulville             21.68
North Barbara             23.49
North Jasmine             25.21
North Jason               22.74
                          ...
Port Johnbury             23.01
Port Samanthamouth        25.64
Raymondhaven              21.48
Reynoldsfurt              21.92
Richardfort               22.37
Roberthaven               23.73
Robertport                23.06
Rodneyfort                28.62
Rogerston                 22.10
Royland                   20.57
Simpsonburgh              23.36
South Evanton             26.73
South Jack                22.97
South Karenland           26.54
South Latoya              20.09
South Michelleport        24.45
South Phillip             28.57
Valentineton              24.64
West Angela               25.99
West Anthony              24.74
West Christopherberg      24.42
West Ericstad             22.35
West Gabriel              20.35
West Heidi                23.13
West Josephberg           21.72
```

```
West Patrickchester     28.23
West Robert             25.12
West Samuelburgh        21.77
Williamsstad            24.36
Williamsview            26.60
Name: fare, Length: 66, dtype: float64
```

In [9]:
```
# Slice merged df by rural type
rural_df = merge_df.loc[merge_df["type"]=="Rural"]
rural_df.sort_values("city")
# Groupby city
group_rural = rural_df.groupby("city")
# Number of rides per city-Rural
rides_city_rural = group_rural["type"].count()
rides_city_rural
# Average fare per city-Rural
avgfare_rural = round(group_rural["fare"].mean(),2)
avgfare_rural
```

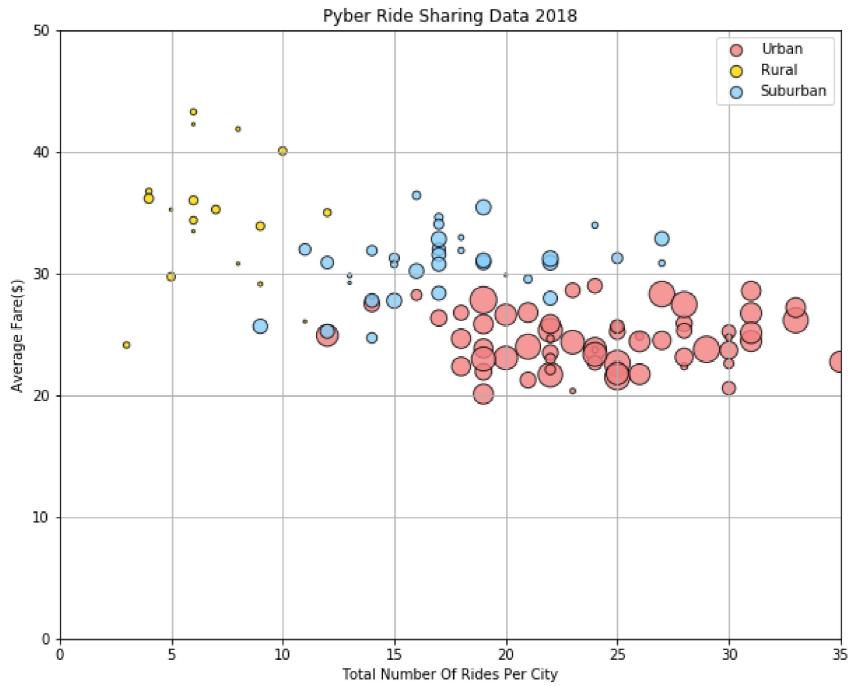
Out[9]:
```
city
Bradshawfurt         40.06
Garzaport            24.12
Harringtonfort       33.47
Jessicaport          36.01
Lake Jamie           34.36
Lake Latoyabury      26.06
Michaelberg          35.00
New Ryantown         43.28
Newtonview           36.75
North Holly          29.13
North Jaime          30.80
Penaborough          35.25
Randallchester       29.74
South Jennifer       35.26
South Marychester    41.87
South Saramouth      36.16
Taylorhaven          42.26
West Heather         33.89
Name: fare, dtype: float64
```

In [10]:
```
# Slice merged df by Suburban type
sub_df = merge_df.loc[merge_df["type"]=="Suburban"]
sub_df.sort_values("city")
# Groupby city
group_sub = sub_df.groupby("city")
# Number of rides per city-Suburban
rides_city_sub = group_sub["type"].count()
rides_city_sub
# Average fare per city-Suburban
avgfare_sub = round(group_sub["fare"].mean(),2)
avgfare_sub
```

Out[10]:
```
city
Barronchester          36.42
Bethanyland            32.96
Brandonfort            35.44
Colemanland            30.89
Davidfurt              32.00
East Aaronbury         25.66
East Danielview        31.56
East Kentstad          29.82
East Marymouth         30.84
Grayville              27.76
Josephside             32.86
Lake Ann               30.89
Lake Omar              28.07
Lake Robertside        31.26
Lake Scott             31.89
Lewishaven             25.24
Lewisland              34.61
Mezachester            30.76
Myersshire             30.20
New Olivia             34.05
New Raymond            27.96
New Shannonberg        28.38
Nicolechester          30.91
North Jeffrey          29.24
North Richardhaven     24.70
North Timothy          31.26
Port Shane             31.08
Rodriguezview          30.75
Sotoville              31.98
South Brenda           33.96
South Teresa           31.22
Veronicaberg           32.83
Victoriaport           27.78
West Hannah            29.55
West Kimmouth          29.87
Williamsonville        31.88
Name: fare, dtype: float64
```

Bubble Plot of Ride Sharing Data

In [11]:
```
# Create scatterplots for each city type dataframes
# Scatter plot for urban
fig = plt.figure(figsize=(10,8))
plt.grid(True)
sct_urban = plt.scatter(x=rides_city_urban,y=avgfare_urban,marker="o",
                        color="lightcoral",s=10*drivers_urban,edgecolor='blac
k', linewidths=1,alpha=0.8,label="Urban")
# Scatter plot for rural
sct_rural = plt.scatter(x=rides_city_rural,y=avgfare_rural,marker="o",
                        color="gold",s=10*drivers_rural,edgecolor='black',line
widths=1,alpha=0.8,label="Rural")
# Scatter plot for Suburban
sct_sub = plt.scatter(x=rides_city_sub,y=avgfare_sub,marker="o",
                      color="lightskyblue",s=10*drivers_sub,edgecolor='black',
linewidths=1,alpha=0.8,label="Suburban")

# Set the legends then set equal sizes for legend pts
lgnd = plt.legend(handles=[sct_urban,sct_rural,sct_sub],loc="best")
lgnd.legendHandles[0]._sizes = [70]
lgnd.legendHandles[1]._sizes = [70]
lgnd.legendHandles[2]._sizes = [70]

# Set texts and positions on the chart
plt.text(36,37,'Note:\nCircle size correlates with driver count per city.',fon
tsize=10)


# Set x and y axis
plt.xlim(0,35)
plt.ylim(0,50)

# axis labels and title
plt.title("Pyber Ride Sharing Data 2018")
plt.xlabel("Total Number Of Rides Per City")
plt.ylabel("Average Fare($)")
plt.savefig("mypyber.png",bbox_inches='tight')

plt.show()
```



Note:
Circle size correlates with driver count per city.

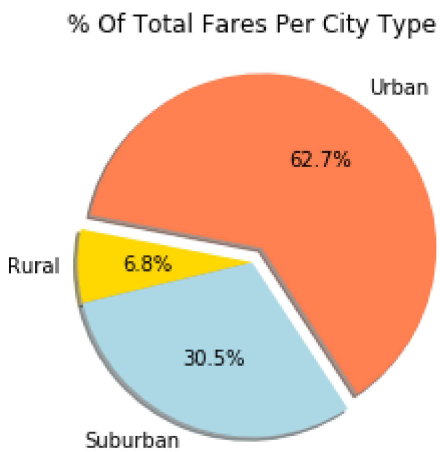
Total Fares by City Type

In [12]:
```
# Pie charts
# Total fares for all the city types combined
total_fare = round(ride_df["fare"].sum(),2)
# Total fares for Urban
grouped_type = merge_df.groupby("type")
total_fare_type = grouped_type["fare"].sum()
# % total fares for each city type
percent_fare_type = [(x/total_fare)*100 for x in total_fare_type]
percent_fare_type
```

Out[12]:
```
[6.811492974983412, 30.463872062732218, 62.72463496228453]
```

In [13]:
```
# Labels for the sections of our pie chart
labels = ["Rural", "Suburban", "Urban"]

# Values per section of the pie chart
percent_fare_type

# Colors per section of the pie chart
colors = ["gold", "lightblue", "Coral"]

# Set matplotlib to seperate the "Python" section from the others
explode = [0, 0, 0.1]
# Create the pie chart and automatically set to find the percentages each part
of the pie chart
plt.pie(percent_fare_type, explode=explode, labels=labels, colors=colors,
        autopct="%1.1f%%", shadow=True, startangle=169)
plt.title("% Of Total Fares Per City Type")
```

Out[13]: Text(0.5, 1.0, '% Of Total Fares Per City Type')



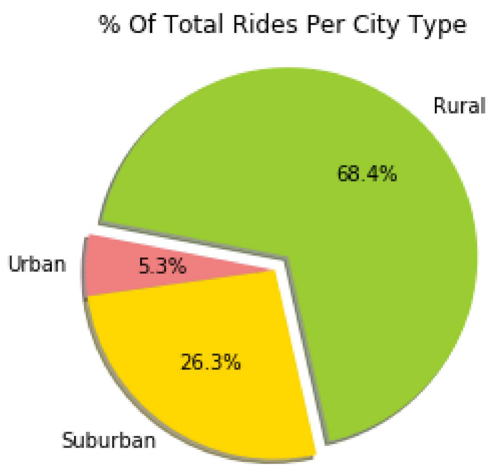
Total Rides by City Type

In [14]:
```
# % of total rides by city type
# Total rides for all cities combined
total_rides = ride_df["ride_id"].count()

# Groupby city type
total_rides_type = grouped_type["ride_id"].count()
total_rides_type

# % total rides per city type
percent_rides_type = [(x/total_rides)*100 for x in total_rides_type]
percent_rides_type
```

Out[14]: [5.263157894736842, 26.31578947368421, 68.42105263157895]

In [15]:
```
# Labels for the sections of our pie chart
labels = ["Urban", "Suburban", "Rural"]

# Value per section of the pie chart
percent_rides_type

# Colors per section of the pie chart
colors = ["lightcoral", "gold", "yellowgreen"]

# Set matplotlib to seperate the "Python" section from the others
explode = [0, 0, 0.1]
# Create the pie chart and automatically set to find the percentages of each p
art of the pie chart
plt.pie(percent_rides_type, explode=explode, labels=labels, colors=colors,
        autopct="%1.1f%%", shadow=True, startangle=169)
plt.title("% Of Total Rides Per City Type")
# Set the matplotlib to show a pie chart with equal axes
plt.axis("equal")
```

Out[15]:
```
(-1.1052772830989732,
 1.1863127973827317,
 -1.1127278884131324,
 1.191025342591955)
```



Total Drivers by City Type

In [16]:
```
# % of total drivers per City Type
# Total drivers for all cities combined
total_drivers = city_df["driver_count"].sum()

# Total drivers for urban
# Groupby city type and city
grouped_city_type = city_df.groupby("type")
total_drivers_type = grouped_city_type["driver_count"].sum()

# % Total drivers per city type
percent_drivers_type = [(x/total_drivers)*100 for x in total_drivers_type]
percent_drivers_type
```

Out[16]:
```
[2.6236125126135215, 16.481668348469558, 80.89471913891691]
```

In [17]:
```
# Labels for the sections of our pie chart
labels = ["Urban", "Suburban", "Rural"]

# Values per section of the pie chart
percent_drivers_type

# Colors per section of the pie chart
colors = ["gold", "lightskyblue", "coral"]

# Set matplotlib to seperate the "Python" section from the others
explode = [0, 0, 0.13]
# Create the pie chart and automatically set to find the percentages of each p
art of the pie chart
plt.pie(percent_drivers_type, explode=explode, labels=labels, colors=colors,
        autopct="%1.1f%%", shadow=True, startangle=169)
plt.title("% Of Total Drivers Per City Type")
# Set matplotlib to show a pie chart with equal axes
plt.axis("equal")
```

Out[17]:
```
(-1.1107992489998582, 1.231274009892694, -1.054002478011723, 1.15775304700421
7)
```