Session 8: Manipulating Data

1. Descriptive Statistics

```
[1]: import pandas as pd
     sales=pd.read_csv('RalphsIRI-cleaned.csv.gz')
     sales.head()
```

```
         week         GTIN                                 description  ounces  \
0  2017-12-31  28400596001   CHESTERS CORN & POTATO SNACK FLAMIN HOT   5.500
1  2017-12-31  28400087691   CHESTERS CORN & POTATO SNACK FLAMIN HOT   1.125
2  2017-12-31  28400437741   CHESTERS CORN & POTATO SNACK FLAMIN HOT   4.000
3  2017-12-31  28400190801       SABRITONES WHEAT SNACK CHILI & LIME   4.250
4  2017-12-31  28400183902  CHEETOS CHEESE SNACK CHEESE 50% LESS FAT   7.625

   revenue  sold  average_price
0  9763.00  4882       1.999795
1    77.50   155       0.500000
2  2834.13  1677       1.690000
3   446.00   223       2.000000
4  1872.30   572       3.273252
```

```
[2]: sales.shape
```

```
(14129, 7)
```

```
[3]: len(sales)
```

```
14129
```

```
[4]: sales.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 14129 entries, 0 to 14128
Data columns (total 7 columns):
week             14129 non-null object
GTIN             14129 non-null int64
description      14129 non-null object
ounces           14078 non-null float64
revenue          14129 non-null float64
sold             14129 non-null int64
average_price    14129 non-null float64
dtypes: float64(3), int64(2), object(2)
memory usage: 772.8+ KB
```

```
[5]: sales['week']=pd.to_datetime(sales['week'])
     sales.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 14129 entries, 0 to 14128
Data columns (total 7 columns):
week             14129 non-null datetime64[ns]
```

```
GTIN             14129 non-null int64
description      14129 non-null object
ounces           14078 non-null float64
revenue          14129 non-null float64
sold             14129 non-null int64
average_price    14129 non-null float64
dtypes: datetime64[ns](1), float64(3), int64(2), object(1)
memory usage: 772.8+ KB
```

```
[6]: sales.describe()
```

	GTIN	ounces	revenue	sold	average_price
count	1.412900e+04	14078.000000	14129.000000	14129.000000	14129.000000
mean	2.873476e+10	7.602797	4594.782186	1620.759856	2.866945
std	1.622473e+10	4.389907	7633.994698	2764.051875	1.503567
min	2.840000e+10	0.750000	0.300000	1.000000	0.300000
25%	2.840015e+10	4.125000	153.090000	74.000000	1.890000
50%	2.840037e+10	7.750000	1708.120000	657.000000	2.661667
75%	2.840063e+10	9.500000	5538.600000	1896.000000	3.293012
max	8.158710e+11	27.250000	82078.190000	38289.000000	13.990000

```
[7]: sales.columns
```

```
Index(['week', 'GTIN', 'description', 'ounces', 'revenue', 'sold',
       'average_price'],
      dtype='object')
```

```
[8]: sales.index
```

```
RangeIndex(start=0, stop=14129, step=1)
```

Q1: Type in the above commands and explain to your neighbor what you can learn from the outputs.

2. Zooming in to Examine a Small Piece

```
[9]: sales.groupby('GTIN')['revenue'].sum().head()
```

```
GTIN
28400002105    317433.32
28400002114    253299.73
28400002266    504977.76
28400002284    124907.61
28400002294    179492.13
Name: revenue, dtype: float64
```

```
[10]: sales.groupby('GTIN')['revenue'].sum().sort_values(ascending=False).head()
```

```
GTIN
28400642031    2735406.59
28400154431    1862912.68
28400589891    1815165.97
28400645491    1740759.67
28400154401    1591435.49
Name: revenue, dtype: float64
```

[11]:
```
gtin=28400642031
small=sales.query('GTIN==@gtin').set_index('week')
small.head()
```

```
                GTIN                        description  ounces   revenue  \
week
2017-12-31  28400642031  DORITOS TORTILLA CHIP NACHO CHEESE    9.75  51815.92
2018-01-07  28400642031  DORITOS TORTILLA CHIP NACHO CHEESE    9.75  65611.04
2018-01-14  28400642031  DORITOS TORTILLA CHIP NACHO CHEESE    9.75  57992.27
2018-01-21  28400642031  DORITOS TORTILLA CHIP NACHO CHEESE    9.75  49475.77
2018-01-28  28400642031  DORITOS TORTILLA CHIP NACHO CHEESE    9.75  54427.00

             sold  average_price
week
2017-12-31  18555       2.792558
2018-01-07  24724       2.653739
2018-01-14  23397       2.478620
2018-01-21  19284       2.565638
2018-01-28  23012       2.365157
```

[12]:
```
# Alternative
small=sales[sales['GTIN']==gtin].set_index('week')
small.head()
```

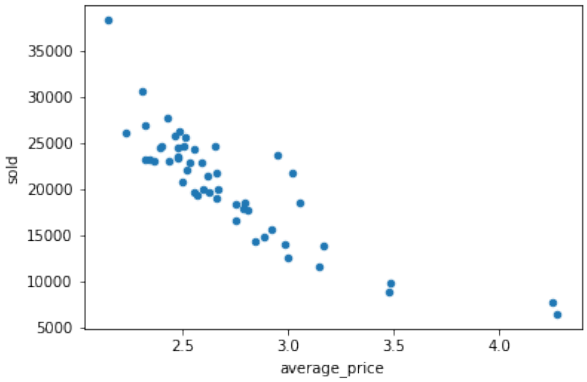
```
                GTIN                        description  ounces   revenue  \
week
2017-12-31  28400642031  DORITOS TORTILLA CHIP NACHO CHEESE    9.75  51815.92
2018-01-07  28400642031  DORITOS TORTILLA CHIP NACHO CHEESE    9.75  65611.04
2018-01-14  28400642031  DORITOS TORTILLA CHIP NACHO CHEESE    9.75  57992.27
2018-01-21  28400642031  DORITOS TORTILLA CHIP NACHO CHEESE    9.75  49475.77
2018-01-28  28400642031  DORITOS TORTILLA CHIP NACHO CHEESE    9.75  54427.00

             sold  average_price
week
2017-12-31  18555       2.792558
2018-01-07  24724       2.653739
2018-01-14  23397       2.478620
2018-01-21  19284       2.565638
2018-01-28  23012       2.365157
```

[13]:
```
import matplotlib.pyplot as plt
small.plot(subplots=True,figsize=(10,10))
plt.show()
```

```
<Figure size 1000x1000 with 5 Axes>
```

[14]:
```
small.plot(x='average_price',y='sold',kind='scatter')
```

```
<matplotlib.axes._subplots.AxesSubplot at 0x7f7653734908>
```



Q2: Find the product with the highest average price (unweighted average across the data set) and plot the revenue, units sold, and average price over time.

3. Grouping and Aggregating the Data

```
[19]: products=sales.groupby('GTIN')\
          .agg({'description':'first','ounces':'first','revenue':'sum','sold':'sum'})
      products['average_price']=products['revenue']/products['sold']
      products=products.sort_values(by='revenue',ascending=False).reset_index()
      products.head()
```

	GTIN	description	ounces	\
0	28400642031	DORITOS TORTILLA CHIP NACHO CHEESE	9.75	
1	28400154431	ALL FRITO LAY PRODUCTS ASTSS SALTED SNACKS ASS...	18.00	
2	28400589891	CHEETOS CHEESE SNACK FLAMIN HOT	8.50	
3	28400645491	LAYS POTATO CHIP CLASSIC	10.00	
4	28400154401	ALL FRITO LAY PRODUCTS ASTSS SALTED SNACKS ASS...	18.00	

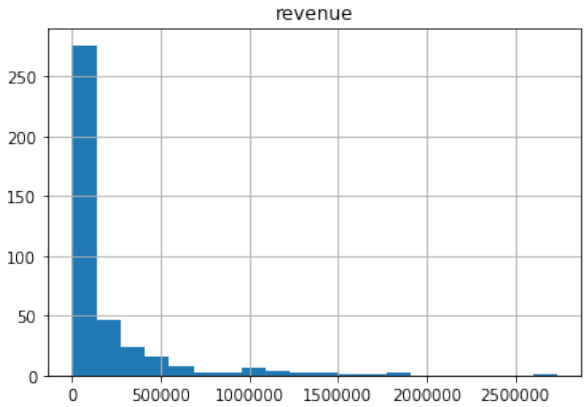
	revenue	sold	average_price
0	2735406.59	1046022	2.615056
1	1862912.68	269550	6.911195
2	1815165.97	680959	2.665602
3	1740759.67	665793	2.614566
4	1591435.49	230412	6.906912

```
[20]: products.shape
```

```
(394, 6)
```

```
[21]: products.hist('revenue',bins=20)
```

```
array([[<matplotlib.axes._subplots.AxesSubplot object at 0x7f7653568208>]],
      dtype=object)
```



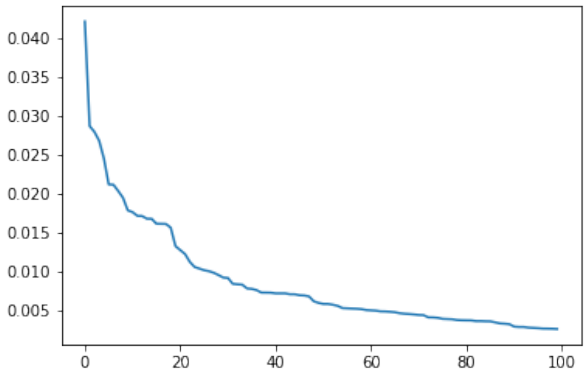
[22]:
```
products['revenue_share']=products['revenue']/(products['revenue'].sum())
products.head()
```

	GTIN	description	ounces	\
0	28400642031	DORITOS TORTILLA CHIP NACHO CHEESE	9.75	
1	28400154431	ALL FRITO LAY PRODUCTS ASTSS SALTED SNACKS ASS...	18.00	
2	28400589891	CHEETOS CHEESE SNACK FLAMIN HOT	8.50	
3	28400645491	LAYS POTATO CHIP CLASSIC	10.00	
4	28400154401	ALL FRITO LAY PRODUCTS ASTSS SALTED SNACKS ASS...	18.00	

	revenue	sold	average_price	revenue_share
0	2735406.59	1046022	2.615056	0.042135
1	1862912.68	269550	6.911195	0.028696
2	1815165.97	680959	2.665602	0.027960
3	1740759.67	665793	2.614566	0.026814
4	1591435.49	230412	6.906912	0.024514

[23]:
```
products['revenue_share'][:100].plot()
```

```
<matplotlib.axes._subplots.AxesSubplot at 0x7f765382c1d0>
```



Q3: Perform an analogous analysis as above using the product of number units sold and the weight of each unit, instead of the revenue.

4. Efficiently Analyzing Text

[24]:
```
pd.set_option('display.max_colwidth',100)
```

[25]:
```
products['description'][:20]
```

```
0                                DORITOS TORTILLA CHIP NACHO CHEESE
1      ALL FRITO LAY PRODUCTS ASTSS SALTED SNACKS ASSORTED BAG IN
2                                   CHEETOS CHEESE SNACK FLAMIN HOT
3                                         LAYS POTATO CHIP CLASSIC
4      ALL FRITO LAY PRODUCTS ASTSS SALTED SNACKS ASSORTED BAG IN
5                                     CHEETOS CHEESE SNACK CHEESE
6                                     CHEETOS CHEESE SNACK CHEESE
7                                  DORITOS TORTILLA CHIP COOL RANCH
8               RUFFLES POTATO CHIP ORIGINAL ZERO GRAMS TRANS FAT
9     TOSTITOS SCOOPS TORTILLA CHIP ORIGINAL ZERO GRAMS TRANS FAT
10                          CHEETOS CHEESE SNACK FLAMING HOT LIMON
11          TOSTITOS TORTILLA CHIP ORIGINAL ZERO GRAMS TRANS FAT
12                                    LAYS POTATO CHIP BARBEQUE
13                                     LAYS POTATO CHIP CLASSIC
14                                  RUFFLES POTATO CHIP ORIGINAL
15                                     FRITOS CORN CHIP ORIGINAL
16                               DORITOS TORTILLA CHIP NACHO CHEESE
17       TOSTITOS TORTILLA CHIP HINT OF LIME ZERO GRAMS TRANS FAT
18                        RUFFLES POTATO CHIP CHEDDAR & SOUR CREAM
19                                  FRITOS SCOOPS CORN CHIP REGULAR
Name: description, dtype: object
```

[26]:
```
products['description'].str.contains('CHEESE').head()
```

```
0     True
1    False
2     True
3    False
4    False
Name: description, dtype: bool
```

[27]:
```
sum(products['description'].str.contains('CHEESE'))
```

```
73
```

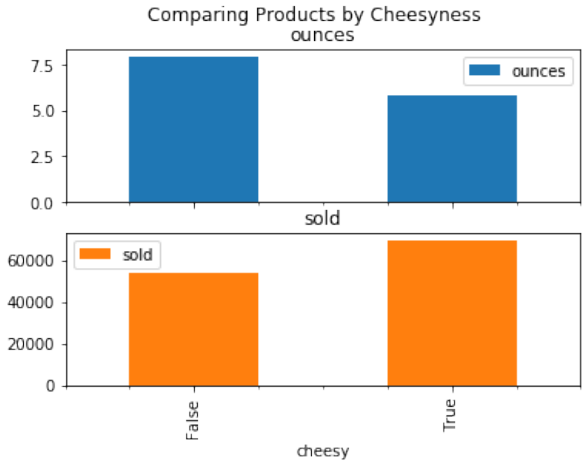
[28]:
```
products['cheesy']=products['description'].str.contains('CHEESE') \
                    | products['description'].str.contains('CHEDDAR')
sum(products['cheesy'])
```

```
101
```

[29]:
```
byCheese=products.groupby('cheesy')\
    .aggregate({'GTIN':'count','ounces':'mean','revenue':'mean','sold':'mean','revenue_

byCheese
```

cheesy	GTIN	ounces	revenue	sold	revenue_share
False	293	7.923791	160422.728532	54142.935154	0.002471
True	101	5.794109	177384.337129	69661.742574	0.002732

[30]:
```
byCheese[['ounces','sold']].plot(kind='bar',subplots=True,title='Comparing Products by
plt.show()
```



Q4: Perform a similar analysis by searching for the words `"HOT"` or `"FLAM"` in the product description, and comparing the sales volume and weight of products with names containing these words and those that do not.