

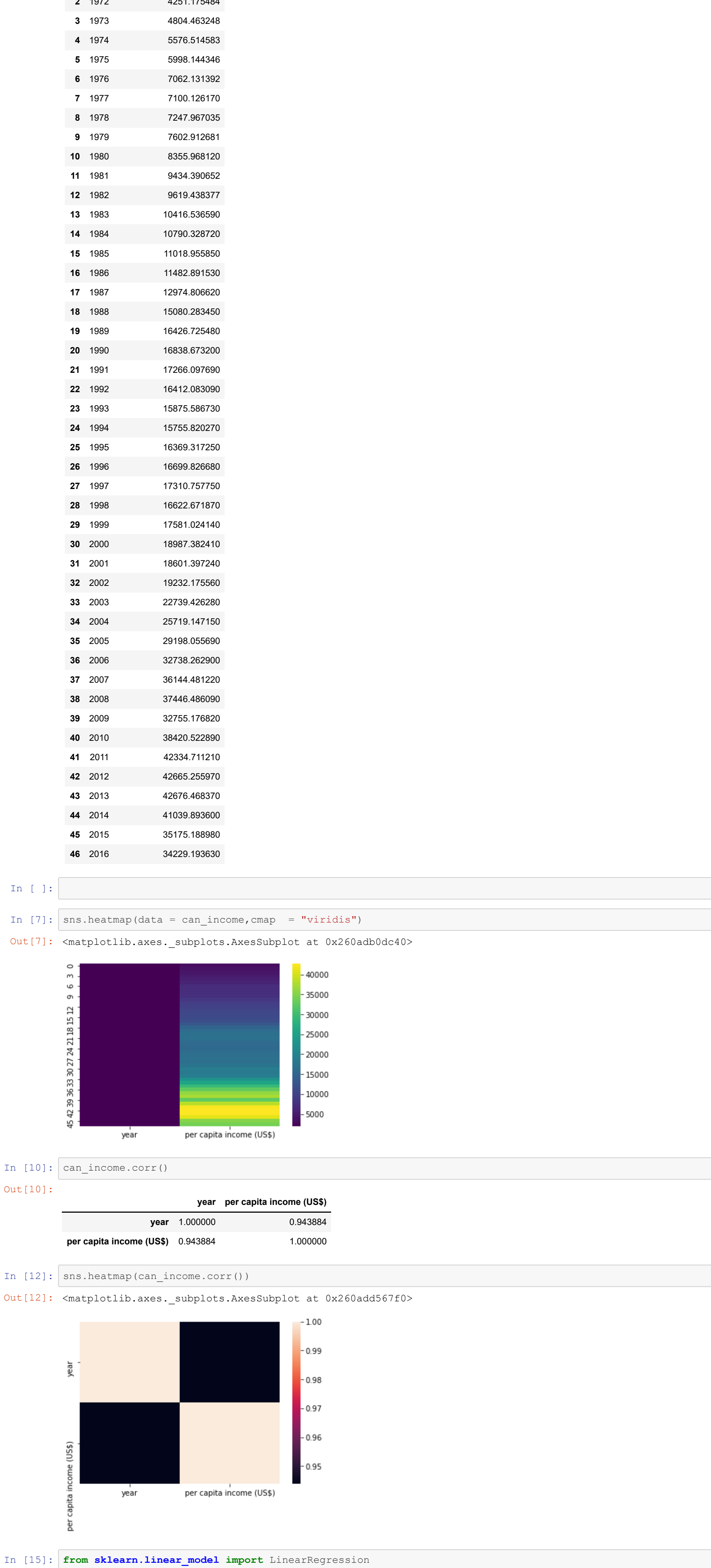
```
[103]: import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt
```

```
In [158]:
```

```
In [4]: can_income = pd.read_csv("canada_per_capita_income.csv") array.reshape(-1, 1)
```

```
In [124]: can_income
```

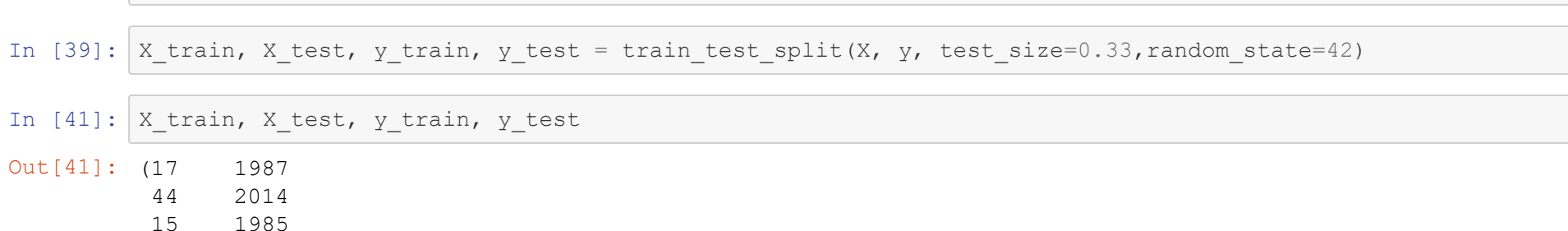
```
Out[124]:
```



```
In [ ]:
```

```
In [7]: sns.heatmap(data = can_income,cmap = "viridis")
```

```
Out[7]: <matplotlib.axes._subplots.AxesSubplot at 0x260adb0dc40>
```



```
In [12]: sns.heatmap(can_income.corr())
```

```
Out[12]: <matplotlib.axes._subplots.AxesSubplot at 0x260add567f0>
```



```
In [15]: from sklearn.linear_model import LinearRegression
```

```
reg = LinearRegression()
```

```
from sklearn.model_selection import train_test_split
```

```
In [19]: X = can_income['year']
y = can_income['per capita income (US$)']
```

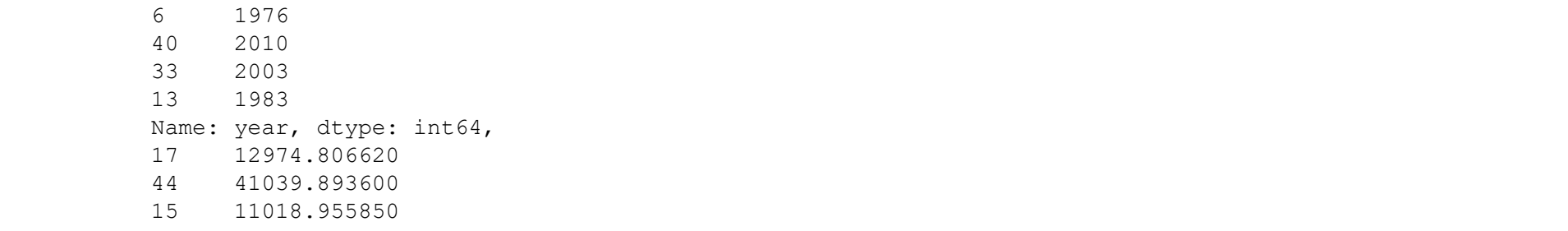
```
In [39]: X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.33, random_state=42)
```

```
In [41]: X_train, X_test, y_train, y_test
```

```
Out[41]: (17 1987
44 2014
15 1985
9 1979
16 1986
28 1999
32 2000
45 2015
0 1970
31 2001
30 2000
5 1975
11 1981
34 2004
34 1971
41 2011
2 1972
35 2005
23 1993
37 2007
10 1980
22 1992
18 1988
46 2016
20 1990
7 1977
42 2012
13 1984
28 1998
38 2008
27 1997
39 2009
26 1996
43 2013
24 1994
36 2006
12 1982
19 1989
4 1974
25 1995
8 1978
3 1973
6 1976
40 2010
33 2003
13 1983
Name: year, dtype: int64,
17 12974.806620
44 41039.893600
15 11018.955850
9 7602.912681
16 11482.891530
28 17581.024140
32 19232.175560
45 35175.188980
0 3399.299037
31 18601.397240
30 16987.382410
5 5998.144346
11 9434.390652
34 25719.147150
1 3768.297935
41 42334.711210
21 17266.097690
2 4251.175484
35 29198.055690
23 15875.586730
37 36144.481220
10 8355.968120
22 16412.083090
18 15080.283450
46 34229.193630
20 16838.673200
7 7100.126170
20 1990
12 1482.891530
42 10790.328720
28 16622.671870
38 37446.486090
Name: per capita income (US$), dtype: float64,
27 17310.757750
39 32755.176820
26 16699.826680
43 42676.468370
24 15755.820270
36 32738.262900
12 9619.438377
19 16426.725480
4 5576.514583
25 16369.317250
8 7247.967035
3 4804.463248
6 7062.131392
40 38420.522890
33 22739.426280
13 10416.536590
Name: per capita income (US$), dtype: float64)
```

```
In [46]: sns.scatterplot(x='per capita income (US$)',y='year',data = can_income)
```

```
Out[46]: <matplotlib.axes._subplots.AxesSubplot at 0x260af53a430>
```



```
In [65]: reg.fit(X_train.values.reshape(-1,1),y_train)
```

```
Out[65]: LinearRegression()
```

```
In [68]: y_pred = reg.predict(X_test.values.reshape(-1,1))
```

```
In [69]: y_pred
```

```
Out[69]: array([22132.18455106, 31971.19876346, 21312.26670003, 35250.8701676 ,
19672.43099726, 29511.44521036, 9833.41678556, 15572.84174279,
3274.07397729, 20492.34884899, 6553.74538142, 2454.15612625,
4913.90967935, 32791.1166145 , 27051.69165276, 10653.33463591])
```

```
In [131]: year = [2019]
reg.predict([year])
```

```
Out[131]: array([40170.3772738])
```

```
In [140]: dict = {'year':2019, 'per capita income (US$)':40170.3772738}
```

```
In [ ]:
```

```
In [144]: index = []
df = pd.DataFrame(dict,index)
```

```
In [145]: df
```

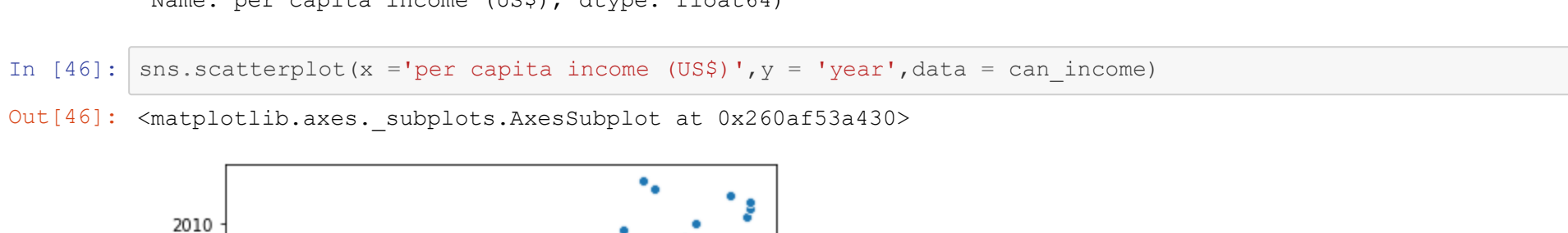
```
Out[145]:
```

```
year per capita income (US$)
0 2019 40170.377274
```

```
In [149]: new = can_income.append(df,ignore_index=True)
```

```
In [150]: new
```

```
Out[150]:
```



```
In [155]: x = new['per capita income (US$)']
y = new['year']
```

```
In [157]: new.iplot(kind='scatter',title = 'canada income productions')
```

```
In [ ]:
```

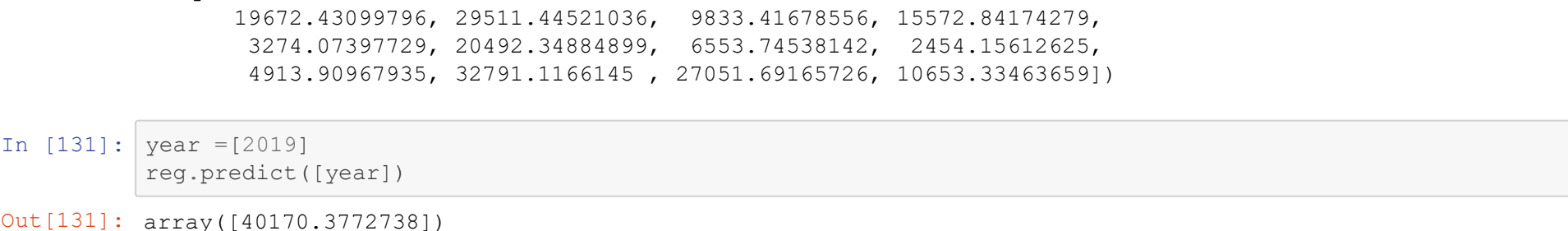
```
In [95]: x2 = reg.score(X_train.values.reshape(-1,1),y_train)
```

```
In [96]:
```

```
Out[96]: 0.8843856415982171
```

```
In [116]: plt.xlabel('per capita income (US$)',fontsize=20)
plt.ylabel('year',fontsize=20)
sns.scatterplot(x = 'per capita income (US$)',y = 'year',data = can_income)
```

```
Out[116]: <matplotlib.axes._subplots.AxesSubplot at 0x260b2db1340>
```



```
In [81]: pip install chart_studio
```

```
Requirement already satisfied: chart_studio in c:\users\758449\anaconda3\lib\site-packages (1.1.0)Not e: you may need to restart the kernel to use updated packages.
```

```
Requirement already satisfied: six in c:\users\758449\anaconda3\lib\site-packages (from chart_studio) (1.15.0)
```

```
Requirement already satisfied: requests in c:\users\758449\anaconda3\lib\site-packages (from chart_studio) (2.24.0)
```

```
Requirement already satisfied: retrying>=1.3.3 in c:\users\758449\anaconda3\lib\site-packages (from chart_studio) (1.3.3)
```

```
Requirement already satisfied: plotly in c:\users\758449\anaconda3\lib\site-packages (from chart_studio) (4.14.3)
```

```
Requirement already satisfied: urllib3<=1.25.0,>=1.21.1 in c:\users\758449\anaconda3\lib\site-packages (from requests>=4.2.0->ipython>=5.3.0->cfflinks) (3.5.1)
```

```
Requirement already satisfied: charset<4,>=3.0.2 in c:\users\758449\anaconda3\lib\site-packages (from requests>=4.2.0->ipython>=5.3.0->cfflinks) (3.0.4)
```

```
Requirement already satisfied: certifi>=2017.4.17 in c:\users\758449\anaconda3\lib\site-packages (from requests>=4.2.0->ipython>=5.3.0->cfflinks) (2020.6.20)
```

```
Requirement already satisfied: idna<3,>=2.5 in c:\users\758449\anaconda3\lib\site-packages (from requests>=4.2.0->ipython>=5.3.0->cfflinks) (2.10)
```

```
In [82]: pip install cfflinks
```

```
Collecting cfflinksNote: you may need to restart the kernel to use updated packages.
```

```
Requirement already satisfied: numpy>=1.9.2 in c:\users\758449\anaconda3\lib\site-packages (from cfflinks) (1.19.5)
```

```
Requirement already satisfied: pandas>=0.19.2 in c:\users\758449\anaconda3\lib\site-packages (from cfflinks) (1.0.5)
```

```
Requirement already satisfied: plotly>=4.1.1 in c:\users\758449\anaconda3\lib\site-packages (from cfflinks) (4.14.3)
```

```
Requirement already satisfied: six>=1.9.0 in c:\users\758449\anaconda3\lib\site-packages (from cfflinks) (1.15.0)
```

```
Collecting colorlover>=0.2.1
  Downloading colorlover-0.2.1-py3-none-any.whl (8.9 kb)
```

```
Requirement already satisfied: setuptools>=34.4.1 in c:\users\758449\anaconda3\lib\site-packages (from colorlover) (49.2.0.post20200714)
```

```
Requirement already satisfied: ipython>=5.3.0 in c:\users\758449\anaconda3\lib\site-packages (from colorlover) (7.16.1)
```

```
Requirement already satisfied: ipywidgets>=7.0.0 in c:\users\758449\anaconda3\lib\site-packages (from colorlover) (7.5.1)
```

```
Requirement already satisfied: python-dateutil>=2.6.1 in c:\users\758449\anaconda3\lib\site-packages (from pandas>=0.19.2->cfflinks) (2.0.0)
```

```
Requirement already satisfied: retrying>=1.3.3 in c:\users\758449\anaconda3\lib\site-packages (from plotly>=4.1.1->cfflinks) (1.3.3)
```

```
Requirement already satisfied: colorama; sys_platform == "win32" in c:\users\758449\anaconda3\lib\site-packages (from ipython>=5.3.0->cfflinks) (0.4.3)
```

```
Requirement already satisfied: decorator in c:\users\758449\anaconda3\lib\site-packages (from ipython>=5.3.0->cfflinks) (4.4.2)
```

```
Requirement already satisfied: backcall in c:\users\758449\anaconda3\lib\site-packages (from ipython>=5.3.0->cfflinks) (0.2.0)
```

```
Requirement already satisfied: prompt>=4.2 in c:\users\758449\anaconda3\lib\site-packages (from ipywidgets>=7.0.0->cfflinks) (4.3.1)
```

```
Requirement already satisfied: traitlets>=4.2 in c:\users\758449\anaconda3\lib\site-packages (from ipywidgets>=7.0.0->cfflinks) (4.3.3)
```

```
Requirement already satisfied: ipykernel>=3.0.0,>=3.0.1,<3.1.0,>=2.0.0 in c:\users\758449\anaconda3\lib\site-packages (from ipywidgets>=7.0.0->cfflinks) (5.0.7)
```

```
Requirement already satisfied: pickleshare in c:\users\758449\anaconda3\lib\site-packages (from ipytho>=5.3.0->cfflinks) (0.7.5)
```

```
Requirement already satisfied: jedi>=0.10 in c:\users\758449\anaconda3\lib\site-packages (from ipytho>=5.3.0->cfflinks) (0.17.1)
```

```
Requirement already satisfied: pygments>=2.0 in c:\users\758449\anaconda3\lib\site-packages (from ipywidgets>=7.0.0->cfflinks) (2.11.2)
```

```
Requirement already satisfied: terminado>=4.2 in c:\users\758449\anaconda3\lib\site-packages (from ipywidgets>=7.0.0->cfflinks) (0.8.3)
```

```
Requirement already satisfied: Send2Trash in c:\users\758449\anaconda3\lib\site-packages (from notebook>=4.4.1->widgets>=7.0.0->cfflinks) (1.9.0)
```

```
Requirement already satisfied: jinja2 in c:\users\758449\anaconda3\lib\site-packages (from notebook>=4.4.1->widgets>=7.0.0->cfflinks) (2.11.2)
```

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Requirement already satisfied: ipykernel>=3.5.0->ipywidgets>=7.0.0->cfflinks) (3.1.5)
```

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Requirement already satisfied: terminado>=4.2 in c:\users\758449\anaconda3\lib\site-packages (from ipywidgets>=7.0.0->cfflinks) (0.8.3)
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Requirement already satisfied: ipykernel>=3.5.0->ipywidgets>=7.0.0->cfflinks) (3.1.5)
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Requirement already satisfied: terminado>=4.2 in c:\users\758449\anaconda3\lib\site-packages (from ipywidgets>=7.0.0->cfflinks) (0.8.3)
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Requirement already satisfied: terminado>=4.2 in c:\users\758449\anaconda3\lib\site-packages (from ipywidgets>=7.0.0->cfflinks) (0.8.3)
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Requirement already satisfied: terminado>=4.2 in c:\users\758449\anaconda3\lib\site-packages (from ipywidgets>=7.0.0->cfflinks) (0.8.3)
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Requirement already satisfied: terminado>=4.2 in c:\users\758449\anaconda3\lib\site-packages (from ipywidgets>=7.0.0->cfflinks) (0.8.3)
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Requirement already satisfied: terminado>=4.2 in c:\users\758449\anaconda3\lib\site-packages (from ipywidgets>=7.0.0->cfflinks) (0.8.3)
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Requirement already satisfied: terminado>=4.2 in c:\users\758449\anaconda3\lib\site-packages (from ipywidgets>=7.0.0->cfflinks) (0.8.3)
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Requirement already satisfied: terminado>=4.2 in c:\users\758449\anaconda3\lib\site-packages (from ipywidgets>=7.0.0->cfflinks) (0.8.3)
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Requirement already satisfied: terminado>=4.2 in c:\users\758449\anaconda3\lib\site-packages (from ipywidgets>=7.0.0->cfflinks) (0.8.3)
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Requirement already satisfied: terminado>=4.2 in c:\users\758449\anaconda3\lib\site-packages (from ipywidgets>=7.0.0->cfflinks) (0.8.3)
```

```
Requirement already satisfied: terminado>=4.2 in c:\users\758449\anaconda3\lib\site-packages (from ipywidgets>=7.0.0->cfflinks) (0.8.3)
```

```
Requirement already satisfied: terminado>=4.2 in c:\users\758449\anaconda3\lib
```