lec03

August 9, 2021

```python
[1]: from datascience import *
     import numpy as np

     %matplotlib inline
     import matplotlib.pyplot as plots
     plots.style.use('fivethirtyeight')
```

0.1 Words of Caution

- Remember to run the cell above. It's for setting up the environment so you can have access to what's needed for this lecture. For now, don't worry about what it means: we'll learn more about what's inside of it in the next few lectures.
- Data science is not just about code, so please don't go over this notebook by itself. Have the relevant textbook sections or lecture video at hand so that you can go over the discussion along with the code. Thank you!

0.2 Python

```python
[2]: 2 + 9
```

```
[2]: 11
```

```python
[3]: 2 * 9
```

```
[3]: 18
```

```python
[4]: 2 / 9
```

```
[4]: 0.2222222222222222
```

```python
[5]: 2 + 3 * 9
```

```
[5]: 29
```

```python
[6]: (2 + 3) * 9
```

```
[6]: 45
```

```
[7]: # two to the power of four: 2 * 2 * 2 * 2
     2 ** 4
```

[7]: 16

```
[8]: 'hello'
```

[8]: 'hello'

0.3 Names

```
[9]: a = 4
```

```
[10]: a
```

[10]: 4

```
[11]: b = 9
```

```
[12]: b
```

[12]: 9

```
[13]: a * 3
```

[13]: 12

```
[14]: total = a + b
```

```
[15]: total
```

[15]: 13

```
[16]: a = 10
```

```
[17]: total
```

[17]: 13

```
[18]: total = a + b
```

```
[19]: total
```

[19]: 19

```
[20]: 'total'
```

```
[20]: 'total'
```

0.3.1 Why Names?

```
[21]: hours_per_week = 40
      weeks_per_year = 52
```

```
[22]: hours_per_year = hours_per_week * weeks_per_year
```

```
[23]: hours_per_year
```

```
[23]: 2080
```

```
[24]: # Minimum wage for businesses w/26 or more employees
      # Goes up by $1/hr until 2022
      ca_hourly_minimum_wage = 13.00
```

```
[25]: weekly_wages = hours_per_week * ca_hourly_minimum_wage
      weekly_wages
```

```
[25]: 520.0
```

```
[26]: yearly_wages = hours_per_year * ca_hourly_minimum_wage
      yearly_wages
```

```
[26]: 27040.0
```

```
[27]: 40 * 13.00
```

```
[27]: 520.0
```

```
[28]: 40 * 52 * 13.00
```

```
[28]: 27040.0
```

0.4 Functions and Call Expressions

```
[29]: abs(-5)
```

```
[29]: 5
```

```
[30]: abs(1 - 3)
```

```
[30]: 2
```

```
[31]: day_temp = 52
      night_temp = 47
      abs(night_temp - day_temp)
```

[31]: 5

```
[32]: min(14, 15)
```

[32]: 14

```
[33]: round(123.456)
```

[33]: 123

```
[34]: round(123.456, 1)
```

[34]: 123.5

```
[35]: round(123.456, ndigits=1)
```

[35]: 123.5

0.5 Tables

```
[36]: cones = Table.read_table('cones.csv')
      cones
```

```
[36]: Flavor      | Color       | Price
      strawberry | pink        | 3.55
      chocolate  | light brown | 4.75
      chocolate  | dark brown  | 5.25
      strawberry | pink        | 5.25
      chocolate  | dark brown  | 5.25
      bubblegum  | pink        | 4.75
```

```
[37]: cones.show(3)
```

<IPython.core.display.HTML object>

```
[38]: cones.show()
```

<IPython.core.display.HTML object>

```
[39]: cones.select('Flavor')
```

[39]: Flavor
      strawberry

```
chocolate
chocolate
strawberry
chocolate
bubblegum
```

[40]: `cones.select('Flavor', 'Price')`

[40]:
```
Flavor     | Price
strawberry | 3.55
chocolate  | 4.75
chocolate  | 5.25
strawberry | 5.25
chocolate  | 5.25
bubblegum  | 4.75
```

[41]: `cones.select(Flavor, 'Price')`

```
---------------------------------------------------------------------------
NameError                                 Traceback (most recent call last)
<ipython-input-41-90b78adc5c4e> in <module>
----> 1 cones.select(Flavor, 'Price')

NameError: name 'Flavor' is not defined
```

[42]: `cones.drop('Price')`

[42]:
```
Flavor     | Color
strawberry | pink
chocolate  | light brown
chocolate  | dark brown
strawberry | pink
chocolate  | dark brown
bubblegum  | pink
```

[43]: `cones`

[43]:
```
Flavor     | Color       | Price
strawberry | pink        | 3.55
chocolate  | light brown | 4.75
chocolate  | dark brown  | 5.25
strawberry | pink        | 5.25
chocolate  | dark brown  | 5.25
bubblegum  | pink        | 4.75
```

```
[44]:  cones_without_price = cones.drop('Price')
       cones_without_price
```

```
[44]:  Flavor      | Color
       strawberry | pink
       chocolate  | light brown
       chocolate  | dark brown
       strawberry | pink
       chocolate  | dark brown
       bubblegum  | pink
```

```
[45]:  cones.where('Flavor', 'chocolate')
```

```
[45]:  Flavor     | Color       | Price
       chocolate  | light brown | 4.75
       chocolate  | dark brown  | 5.25
       chocolate  | dark brown  | 5.25
```

```
[46]:  cones.sort('Price')
```

```
[46]:  Flavor      | Color       | Price
       strawberry | pink        | 3.55
       chocolate  | light brown | 4.75
       bubblegum  | pink        | 4.75
       chocolate  | dark brown  | 5.25
       strawberry | pink        | 5.25
       chocolate  | dark brown  | 5.25
```

```
[47]:  cones.sort('Price', descending=True)
```

```
[47]:  Flavor      | Color       | Price
       chocolate  | dark brown  | 5.25
       strawberry | pink        | 5.25
       chocolate  | dark brown  | 5.25
       chocolate  | light brown | 4.75
       bubblegum  | pink        | 4.75
       strawberry | pink        | 3.55
```

```
[48]:  cones.sort('Flavor', descending=True)
```

```
[48]:  Flavor      | Color       | Price
       strawberry | pink        | 3.55
       strawberry | pink        | 5.25
       chocolate  | light brown | 4.75
       chocolate  | dark brown  | 5.25
       chocolate  | dark brown  | 5.25
       bubblegum  | pink        | 4.75
```

0.5.1 A more interesting table

```
[49]: skyscrapers = Table.read_table('skyscrapers.csv')
      skyscrapers
```

```
[49]: name                              | material  | city          | height |
      completed
      One World Trade Center            | composite | New York City | 541.3  | 2014
      Willis Tower                      | steel     | Chicago       | 442.14 | 1974
      432 Park Avenue                   | concrete  | New York City | 425.5  | 2015
      Trump International Hotel & Tower | concrete  | Chicago       | 423.22 | 2009
      Empire State Building             | steel     | New York City | 381    | 1931
      Bank of America Tower             | composite | New York City | 365.8  | 2009
      Stratosphere Tower                | concrete  | Las Vegas     | 350.22 | 1996
      Aon Center                        | steel     | Chicago       | 346.26 | 1973
      John Hancock Center               | steel     | Chicago       | 343.69 | 1969
      WITI TV Tower                     | steel     | Shorewood     | 329    | 1962
      … (190 rows omitted)
```

```
[50]: skyscrapers.where('city', 'Los Angeles')
```

```
[50]: name                  | material | city        | height | completed
      U.S. Bank Tower       | steel    | Los Angeles | 310.29 | 1990
      Aon Center            | steel    | Los Angeles | 261.52 | 1974
      Two California Plaza   | steel    | Los Angeles | 228.6  | 1992
      Gas Company Tower      | steel    | Los Angeles | 228.3  | 1991
      Bank of America Plaza  | steel    | Los Angeles | 224.03 | 1975
      777 Tower              | steel    | Los Angeles | 221    | 1991
      Wells Fargo Tower      | steel    | Los Angeles | 220.37 | 1983
      Figueroa at Wilshire   | steel    | Los Angeles | 218.54 | 1989
      City National Tower    | steel    | Los Angeles | 213.06 | 1971
      Paul Hastings Tower    | steel    | Los Angeles | 213.06 | 1971
      … (1 rows omitted)
```

```
[51]: skyscrapers.where('name', 'Empire State Building')
```

```
[51]: name                  | material | city          | height | completed
      Empire State Building | steel    | New York City | 381    | 1931
```

```
[52]: skyscrapers.where('city', 'New York City').sort('completed')
```

```
[52]: name                     | material | city          | height | completed
      Metropolitan Life Tower  | steel    | New York City | 213.36 | 1909
      Woolworth Building       | steel    | New York City | 241.4  | 1913
      Chanin Building          | steel    | New York City | 197.8  | 1929
      Mercantile Building      | steel    | New York City | 192.6  | 1929
      Chrysler Building        | steel    | New York City | 318.9  | 1930
```

```
The Trump Building      | steel     | New York City | 282.55 | 1930
One Grand Central Place | steel     | New York City | 205.13 | 1930
Empire State Building   | steel     | New York City | 381    | 1931
Twenty Exchange         | steel     | New York City | 225.86 | 1931
500 Fifth Avenue        | steel     | New York City | 212.45 | 1931
... (63 rows omitted)
```

[53]: `skyscrapers.where('city', 'New York City').sort('completed', descending=True)`

[53]:
```
name                                          | material       | city
| height | completed
432 Park Avenue                               | concrete       | New York
City | 425.5  | 2015
Sky                                           | concrete       | New York
City | 206    | 2015
One World Trade Center                        | composite      | New York
City | 541.3  | 2014
One57                                         | steel/concrete | New York
City | 306.07 | 2014
4 World Trade Center                          | composite      | New York
City | 297.73 | 2014
Courtyard & Residence Inn Manhattan/Central Park | concrete    | New York
City | 229.62 | 2013
Eight Spruce Street                           | concrete       | New York
City | 265.18 | 2011
1 MiMA Tower                                  | concrete       | New York
City | 194.55 | 2011
Goldman Sachs Headquarters                    | steel          | New York
City | 228.3  | 2010
Langham Place                                 | concrete       | New York
City | 192.58 | 2010
... (63 rows omitted)
```