

Representing time with datetimes

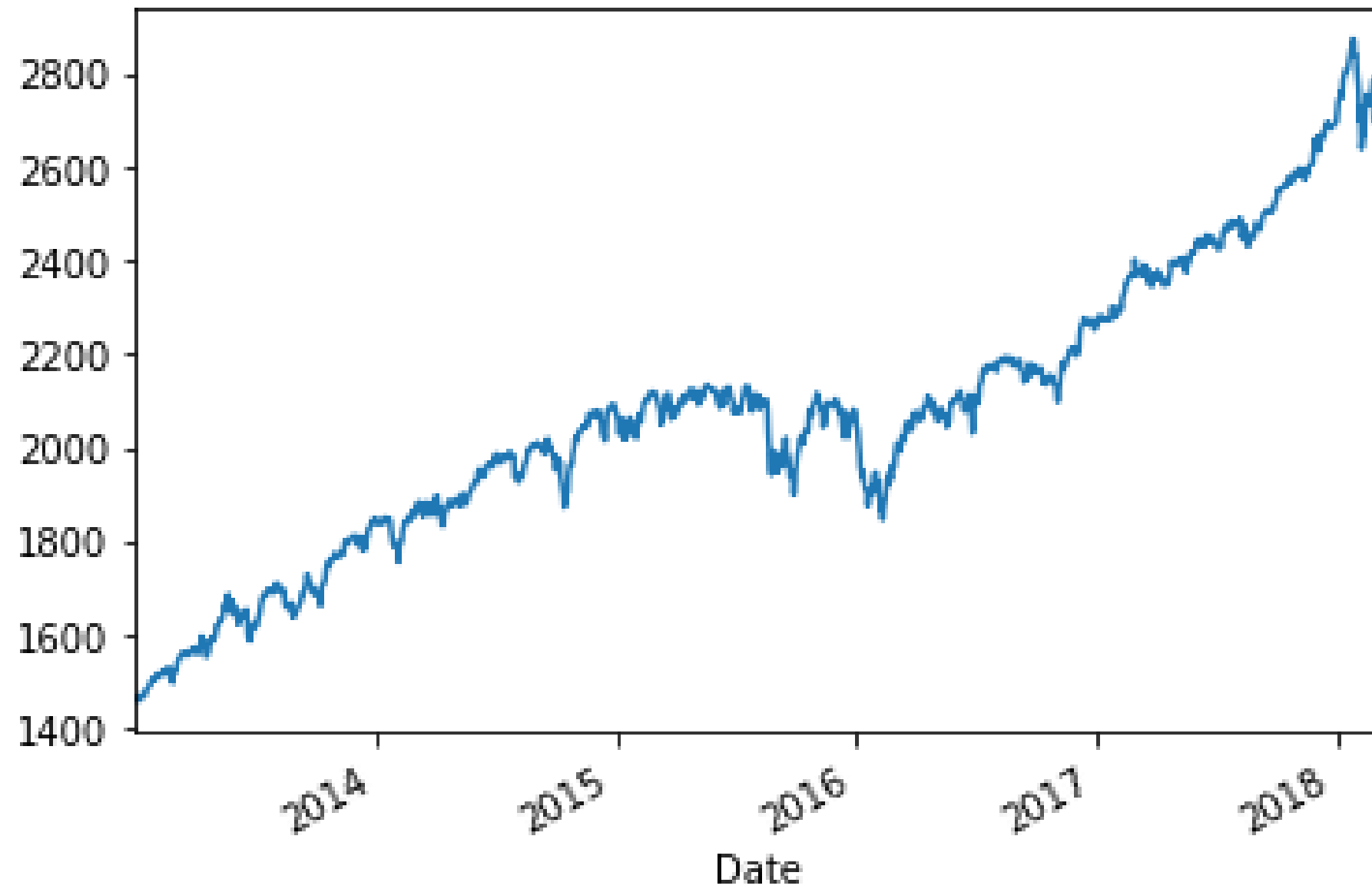
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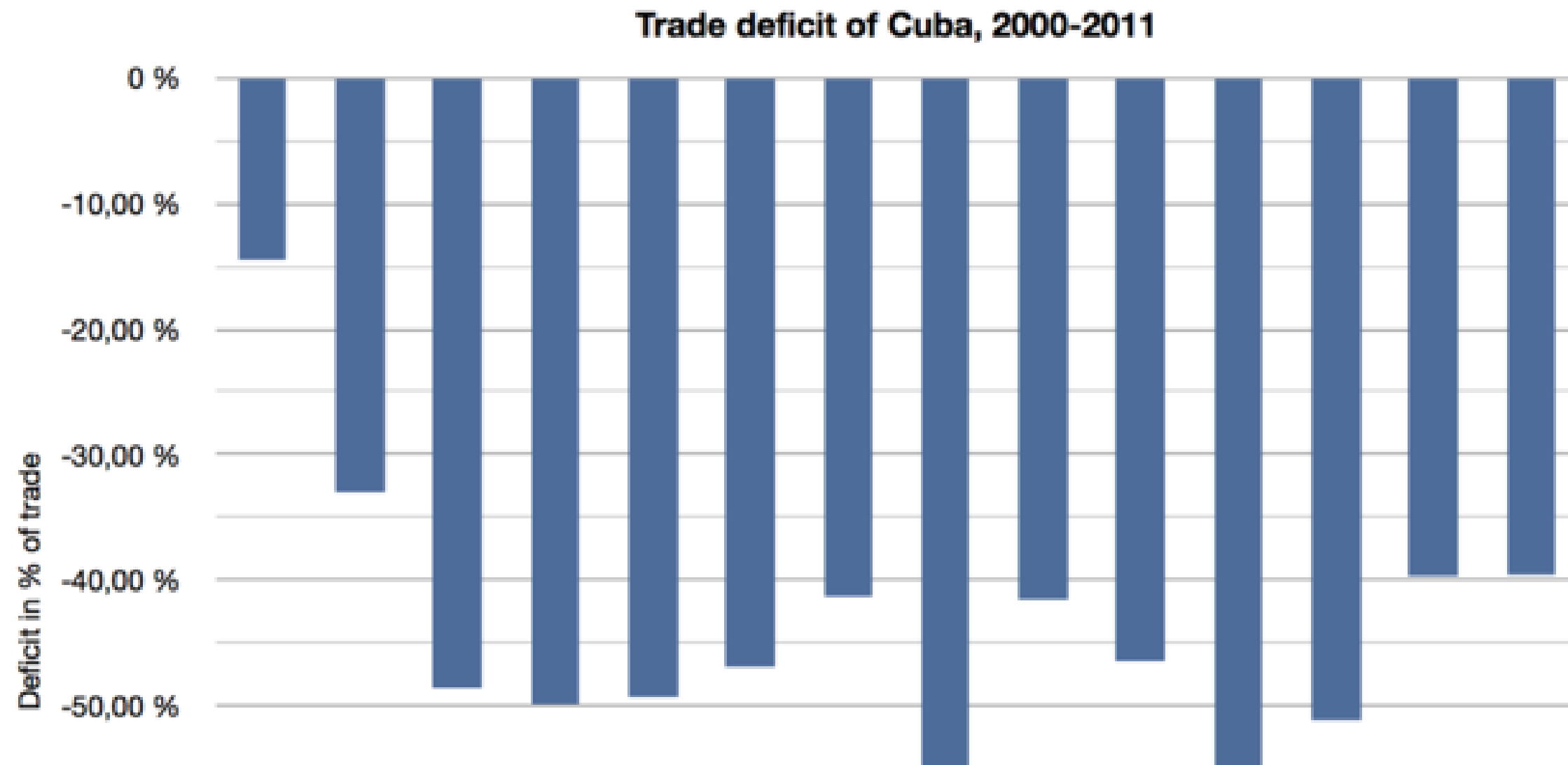
Kennedy Behrman

Data Engineer, Author, Founder

Datetimes



Datetimes



Datetimes

```
from datetime import datetime
```

```
black_monday = datetime(1987, 10, 19)  
print(black_monday)
```

```
datetime.datetime(1987, 10, 19, 0, 0)
```

Datetime now

```
datetime.now()
```

```
datetime.datetime(2019, 11, 6, 3, 48, 30, 886713)
```

Datetime from string

```
black_monday_str = "Monday, October 19, 1987. 9:30 am"  
format_str = "%A, %B %d, %Y. %I:%M %p"  
datetime.datetime.strptime(black_monday_str, format_str)
```

```
datetime.datetime(1987, 10, 19, 9, 30)
```

Datetime from string

Year

- **%y** Without century (01, 02, ..., 98, 99)
- **%Y** With century (0001, 0002, ..., 1998, 1999, ..., 9999)

Month

- **%b** Abbreviated names (Jan, Feb, ..., Nov, Dec)
- **%B** Full names (January, February, ... November, December)
- **%m** As numbers (01, 02, ..., 11, 12)

Day of Month

- **%d** (01, 02, ..., 30, 31)

Datetime from string

Weekday

- **%a** Abbreviated name (Sun, ... Sat)
- **%A** Full name (Sunday, ... Saturday)
- **%w** Number (0, ..., 6)

Hour

- **%H** 24 hour (00, 01, ... 23)
- **%I** 12 hour (01, 02, ... 12)
- **%M** (01, 02, ..., 59)

Datetime from string

Seconds

- `%S` (00, 01, ... 59)

Micro-seconds

- `%f` (000000, 000001, ... 999999)

AM/PM

- `%p` (AM, PM)

Datetime from string

`%m` Months

`%M` Minutes

Datetime from string

```
"1837-05-10"
```

```
%Y
```

```
%m
```

```
%d
```

```
"%Y-%m-%d"
```

Datetime from string

```
"Friday, 17 May 01"
```

```
%A
```

```
%d
```

```
%B
```

```
%y
```

```
"%A, %d %B %y"
```

String from datetime

```
dt.strftime(format_string)
```

String from datetime

```
great_depression_crash = datetime.datetime(1929, 10, 29)
great_depression_crash
```

```
datetime.datetime(1929, 10, 29, 0, 0)
```

```
great_depression_crash.strftime("%a, %b %d, %Y")
```

```
'Tue, Oct 29, 1929'
```

Let's practice!

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Working with datetimes

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Datetime attributes

```
now.year  
now.month  
now.day
```

```
2019  
11  
13
```

```
now.hour  
now.minute  
now.second
```

```
22  
34  
56
```

Comparing datetimes

equals `==`

less than `<`

more than `>`

Comparing datetimes

```
from datetime import datetime  
asian_crisis = datetime(1997, 7, 2)  
world_mini_crash = datetime(1997, 10, 27)
```

```
asian_crisis > world_mini_crash
```

False

```
asian_crisis < world_mini_crash
```

True

Comparing datetimes

```
asian_crisis = datetime(1997, 7, 2)
world_mini_crash = datetime(1997, 10, 27)
```

```
text = "10/27/1997"
format_str = "%m/%d/%Y"
sell_date = datetime.strptime(text, format_str)
```

```
sell_date == world_mini_crash
```

True

Difference between datetimes

- Compare with `<` , `>` , or `==` .
- Subtraction returns a `timedelta` object.
- `timedelta` attributes: weeks, days, minutes, seconds, microseconds

Difference between datetimes

```
delta = world_mini_crash - asian_crisis
```

```
type(delta)
```

```
datetime.timedelta
```

```
delta.days
```

```
117
```

Creating relative datetimes

```
dt
```

```
datetime.datetime(2019, 1, 14, 0, 0)
```

```
datetime(dt.year, dt.month, dt.day - 7)
```

```
datetime.datetime(2019, 1, 7, 0, 0)
```

```
datetime(dt.year, dt.month, dt.day - 15)
```

```
ValueError                                Traceback (most recent call last)
<ipython-input-28-804001f45cdb> in <module>()
-> 1 datetime(dt.year, dt.month, dt.day - 15)
ValueError: day is out of range for month
```

Creating relative datetimes

```
delta = world_mini_crash - asian_crisis  
type(delta)
```

```
datetime.timedelta
```


Creating relative datetimes

```
from datetime import timedelta
```

```
offset = timedelta(weeks = 1)  
offset
```

```
datetime.timedelta(7)
```

```
dt - offset
```

```
datetime.datetime(2019, 1, 7, 0, 0)
```

Creating relative datetimes

```
offset = timedelta(days=16)
dt - offset
```

```
datetime.datetime(2018, 12, 29, 0, 0)
```

```
cur_week = last_week + timedelta(weeks=1)
# Do some work with date
# set last week variable to cur week and repeat
last_week = cur_week
```

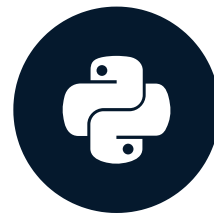
```
source_dt = event_dt - timedelta(weeks=4)
# Use source datetime to look up market factors
```

Let's practice!

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Dictionaries

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Lookup by index

```
my_list = ['a', 'b', 'c', 'd']
```

```
  0   1   2   3  
['a', 'b', 'c', 'd']
```

```
my_list[0]
```

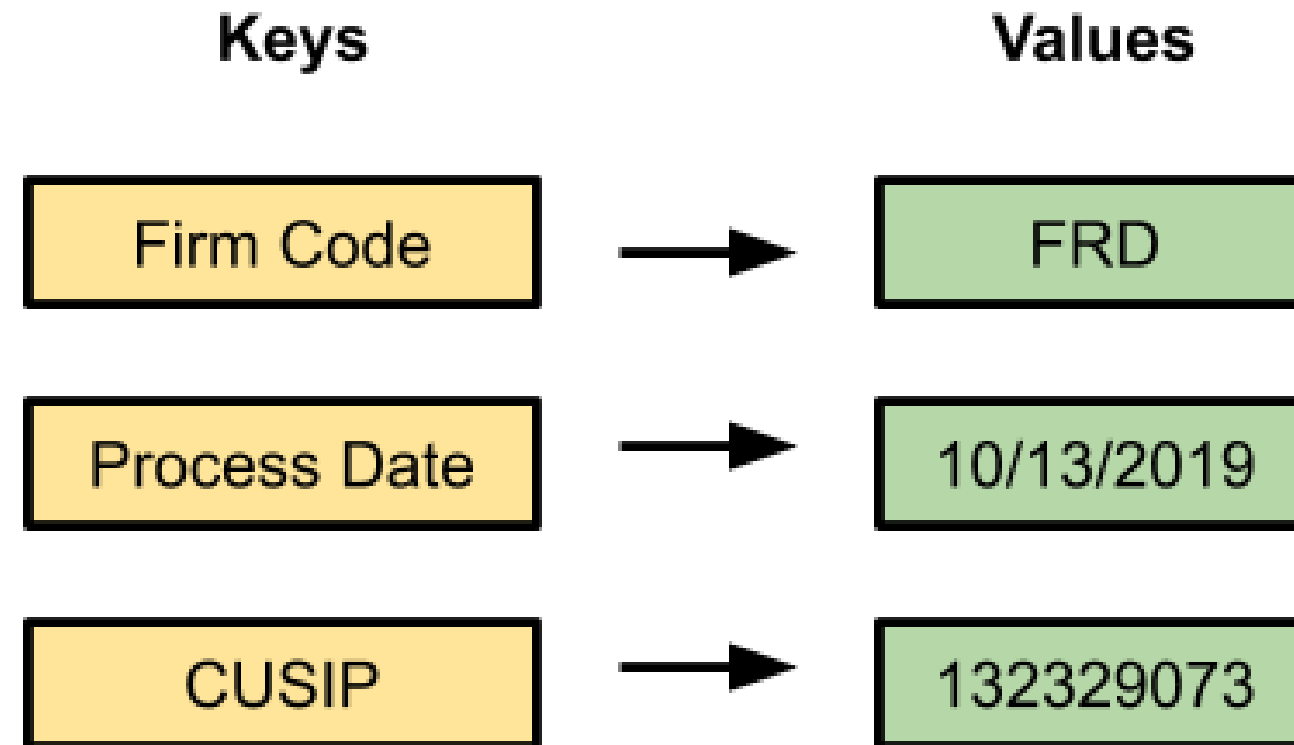
```
'a'
```

```
my_list.index('c')
```

```
2
```

Lookup by key

Dictionaries



Representation

```
{ 'key-1': 'value-1', 'key-2': 'value-2', 'key-3': 'value-3' }
```

Creating dictionaries

```
my_dict = {}  
my_dict
```

```
{}
```

```
my_dict = dict()  
my_dict
```

```
{}
```


Creating dictionaries

```
ticker_symbols = {'AAPL': 'Apple', 'F': 'Ford', 'LUV': 'Southwest'}  
print(ticker_symbols)
```

```
{'AAPL': 'Apple', 'F': 'Ford', 'LUV': 'Southwest'}
```

```
ticker_symbols = dict(['AAPL', 'Apple'], ['F', 'Ford'], ['LUV', 'Southwest'])  
print(ticker_symbols)
```

```
{'AAPL': 'Apple', 'F': 'Ford', 'LUV': 'Southwest'}
```

Adding to dictionaries

```
ticker_symbols['XON'] = 'Exxon'  
ticker_symbols
```

```
{'APPL': 'Apple', 'F': 'Ford', 'LUV': 'Southwest', 'XON': 'Exxon'}
```

```
ticker_symbols['XON'] = 'Exxon OLD'  
ticker_symbols
```

```
{'APPL': 'Apple', 'F': 'Ford', 'LUV': 'Southwest', 'XON': 'Exxon OLD'}
```

Accessing values

```
ticker_symbols['F']
```

```
'Ford'
```

Accessing values

```
ticker_symbols['XOM']
```

```
KeyError                                Traceback (most recent call last)
<ipython-input-6-782fbf617bf7> in <module>()
-> 1 ticker_symbols['XOM']

KeyError: 'XOM'
```

Accessing values

```
company = ticker_symbols.get('LUV')  
print(company)
```

'Southwest'

```
company = ticker_symbols.get('XOM')  
print(company)
```

None

```
company = ticker_symbols.get('XOM', 'MISSING')  
print(company)
```

'MISSING'

Deleting from dictionaries

```
ticker_symbols
```

```
{'APPL': 'Apple', 'F': 'Ford', 'LUV': 'Southwest', 'XON': 'Exxon OLD'}
```

```
del(ticker_symbols['XON'])
```

```
ticker_symbols
```

```
{'APPL': 'Apple', 'F': 'Ford', 'LUV': 'Southwest'}
```

Let's practice!

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