



INTRO TO PYTHON FOR DATA SCIENCE

Python Lists



Python Data Types

- `float` – real numbers
- `int` – integer numbers
- `str` – string, text
- `bool` – `True`, `False`

```
In [1]: height = 1.73
```

```
In [2]: tall = True
```

- Each variable represents single value

Problem

- Data Science: many data points
- Height of entire family

```
In [3]: height1 = 1.73
```

```
In [4]: height2 = 1.68
```

```
In [5]: height3 = 1.71
```

```
In [6]: height4 = 1.89
```

- Inconvenient

Python List

[a, b, c]

```
In [7]: [1.73, 1.68, 1.71, 1.89]
```

```
Out[7]: [1.73, 1.68, 1.71, 1.89]
```

```
In [8]: fam = [1.73, 1.68, 1.71, 1.89]
```

```
In [9]: fam
```

```
Out[9]: [1.73, 1.68, 1.71, 1.89]
```

- Name a collection of values
- Contain any type
- Contain different types

Python List

[a, b, c]

```
In [10]: fam = ["liz", 1.73, "emma", 1.68, "mom", 1.71, "dad", 1.89]
```

```
In [11]: fam
```

```
Out[11]: ['liz', 1.73, 'emma', 1.68, 'mom', 1.71, 'dad', 1.89]
```

```
["liz", 1.73]  
["emma", 1.68]  
["mom", 1.71]  
["dad", 1.89]
```



Python List

[a, b, c]

```
In [10]: fam = ["liz", 1.73, "emma", 1.68, "mom", 1.71, "dad", 1.89]
```

```
In [11]: fam
```

```
Out[11]: ['liz', 1.73, 'emma', 1.68, 'mom', 1.71, 'dad', 1.89]
```

```
In [11]: fam2 = [{"liz", 1.73},  
                 ["emma", 1.68],  
                 ["mom", 1.71],  
                 ["dad", 1.89]]
```

```
In [12]: fam2
```

```
Out[12]: [['liz', 1.73], ['emma', 1.68],  
          ['mom', 1.71], ['dad', 1.89]]
```

List type

```
In [13]: type(fam)
Out[13]: list
```

```
In [14]: type(fam2)
Out[14]: list
```

- Specific functionality
- Specific behavior



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Let's practice!



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Subsetting Lists

Subsetting lists

```
In [1]: fam = ["liz", 1.73, "emma", 1.68, "mom", 1.71, "dad", 1.89]
```

```
In [2]: fam
```

```
Out[2]: ['liz', 1.73, 'emma', 1.68, 'mom', 1.71, 'dad', 1.89]
```

| | | | | | | | | |
|--------|---|---|---|---|---|---|---|---|
| index: | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|--------|---|---|---|---|---|---|---|---|

"zero-based indexing"

Subsetting lists

```
In [1]: fam = ["liz", 1.73, "emma", 1.68, "mom", 1.71, "dad", 1.89]
```

```
In [2]: fam
```

```
Out[2]: ['liz', 1.73, 'emma', 1.68, 'mom', 1.71, 'dad', 1.89]
```

| index: | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|--------|-------|------|--------|------|-------|------|-------|------|
| | 'liz' | 1.73 | 'emma' | 1.68 | 'mom' | 1.71 | 'dad' | 1.89 |

```
In [3]: fam[3]
```

```
Out[3]: 1.68
```

Subsetting lists

```
In [1]: fam = ["liz", 1.73, "emma", 1.68, "mom", 1.71, "dad", 1.89]
```

```
In [2]: fam
```

```
Out[2]: ['liz', 1.73, 'emma', 1.68, 'mom', 1.71, 'dad', 1.89]
```

| index: | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|--------|-------|------|--------|------|-------|------|-------|------|
| | 'liz' | 1.73 | 'emma' | 1.68 | 'mom' | 1.71 | 'dad' | 1.89 |

```
In [3]: fam[3]
```

```
Out[3]: 1.68
```

```
In [4]: fam[6]
```

```
Out[4]: 'dad'
```

Subsetting lists

```
In [1]: fam = ["liz", 1.73, "emma", 1.68, "mom", 1.71, "dad", 1.89]
```

```
In [2]: fam
```

```
Out[2]: ['liz', 1.73, 'emma', 1.68, 'mom', 1.71, 'dad', 1.89]
```

| index: | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|--------|----|----|----|----|----|----|----|----|
| | -8 | -7 | -6 | -5 | -4 | -3 | -2 | -1 |

```
In [3]: fam[3]
```

```
Out[3]: 1.68
```

```
In [4]: fam[6]
```

```
Out[4]: 'dad'
```

```
In [5]: fam[-1]
```

```
Out[5]: 1.89
```

Subsetting lists

```
In [1]: fam = ["liz", 1.73, "emma", 1.68, "mom", 1.71, "dad", 1.89]
```

```
In [2]: fam
```

```
Out[2]: ['liz', 1.73, 'emma', 1.68, 'mom', 1.71, 'dad', 1.89]
```

| | | | | | | | | |
|--------|----|----|----|----|----|----|----|----|
| index: | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| | -8 | -7 | -6 | -5 | -4 | -3 | -2 | -1 |

```
In [3]: fam[3]
```

```
Out[3]: 1.68
```

```
In [4]: fam[6] ←
```

```
Out[4]: 'dad'
```

```
In [5]: fam[-1]
```

```
Out[5]: 1.89
```

```
In [6]: fam[-2] ←
```

```
Out[6]: 'dad'
```

List slicing

```
In [7]: fam
Out[7]: ['liz', 1.73, 'emma', 1.68, 'mom', 1.71, 'dad', 1.89]
```

0 1 2 3 4 5 6 7

```
In [8]: fam[3:5]
Out[8]: [1.68, 'mom']
```

[start : end]

inclusive exclusive



List slicing

```
In [7]: fam
Out[7]: ['liz', 1.73, 'emma', 1.68, 'mom', 1.71, 'dad', 1.89]
```

0 1 2 3 4 5 6 7

```
In [8]: fam[3:5]
Out[8]: [1.68, 'mom']
```

```
In [9]: fam[1:4]
Out[9]: [1.73, 'emma', 1.68]
```

[**start** : **end**]

inclusive **exclusive**



List slicing

```
In [7]: fam
```

```
Out[7]: ['liz', 1.73, 'emma', 1.68, 'mom', 1.71, 'dad', 1.89]
```

| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|-----|------|------|------|-----|------|-----|------|
| liz | 1.73 | emma | 1.68 | mom | 1.71 | dad | 1.89 |

```
In [8]: fam[3:5]
```

```
Out[8]: [1.68, 'mom']
```

```
In [9]: fam[1:4]
```

```
Out[9]: [1.73, 'emma', 1.68]
```

```
In [10]: fam[:4]
```

```
Out[10]: ['liz', 1.73, 'emma', 1.68]
```

List slicing

```
In [7]: fam
Out[7]: ['liz', 1.73, 'emma', 1.68, 'mom', 1.71, 'dad', 1.89]
```

| | | | | | | | | |
|--|----------|----------|----------|----------|----------|----------|----------|----------|
| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|--|----------|----------|----------|----------|----------|----------|----------|----------|

```
In [8]: fam[3:5]
Out[8]: [1.68, 'mom']
```

```
In [9]: fam[1:4]
Out[9]: [1.73, 'emma', 1.68]
```

```
In [10]: fam[:4]
Out[10]: ['liz', 1.73, 'emma', 1.68]
```

```
In [11]: fam[5:]
Out[11]: [1.71, 'dad', 1.89]
```



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Let's practice!



INTRO TO PYTHON FOR DATA SCIENCE

Manipulating Lists

List Manipulation

- Change list elements
- Add list elements
- Remove list elements

Changing list elements

```
In [1]: fam = ["liz", 1.73, "emma", 1.68, "mom", 1.71, "dad", 1.89]
```

```
In [2]: fam
```

```
Out[2]: ['liz', 1.73, 'emma', 1.68, 'mom', 1.71, 'dad', 1.89]
```

```
In [3]: fam[7] = 1.86
```

```
In [4]: fam
```

```
Out[4]: ['liz', 1.73, 'emma', 1.68, 'mom', 1.71, 'dad', 1.86]
```

```
In [5]: fam[0:2] = ["lisa", 1.74]
```

```
In [6]: fam
```

```
Out[6]: ['lisa', 1.74, 'emma', 1.68, 'mom', 1.71, 'dad', 1.86]
```

Adding and removing elements

```
In [7]: fam + ["me", 1.79]
```

```
Out[7]: ['lisa', 1.74, 'emma', 1.68,  
        'mom', 1.71, 'dad', 1.86, 'me', 1.79]
```

```
In [8]: fam_ext = fam + ["me", 1.79]
```

```
In [9]: del(fam[2])
```

```
In [10]: fam
```

```
Out[10]: ['lisa', 1.74, 1.68, 'mom', 1.71, 'dad', 1.86]
```

```
In [11]: del(fam[2])
```

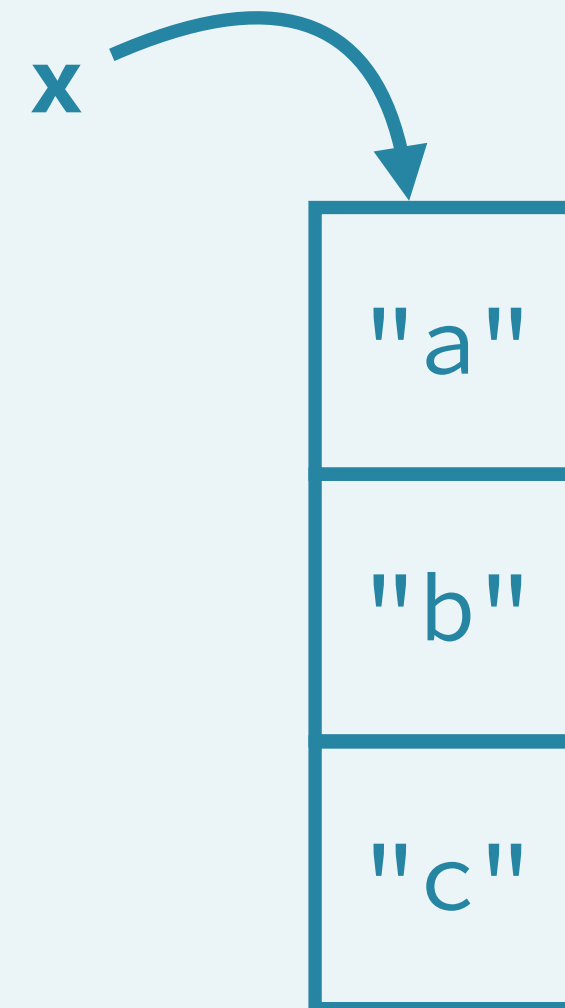
```
In [12]: fam
```

```
Out[12]: ['lisa', 1.74, 'mom', 1.71, 'dad', 1.86]
```

Behind the scenes (1)

```
In [13]: x = ["a", "b", "c"]
```

```
In [14]: y = x
```



Behind the scenes (1)

```
In [13]: x = ["a", "b", "c"]
```

```
In [14]: y = x
```

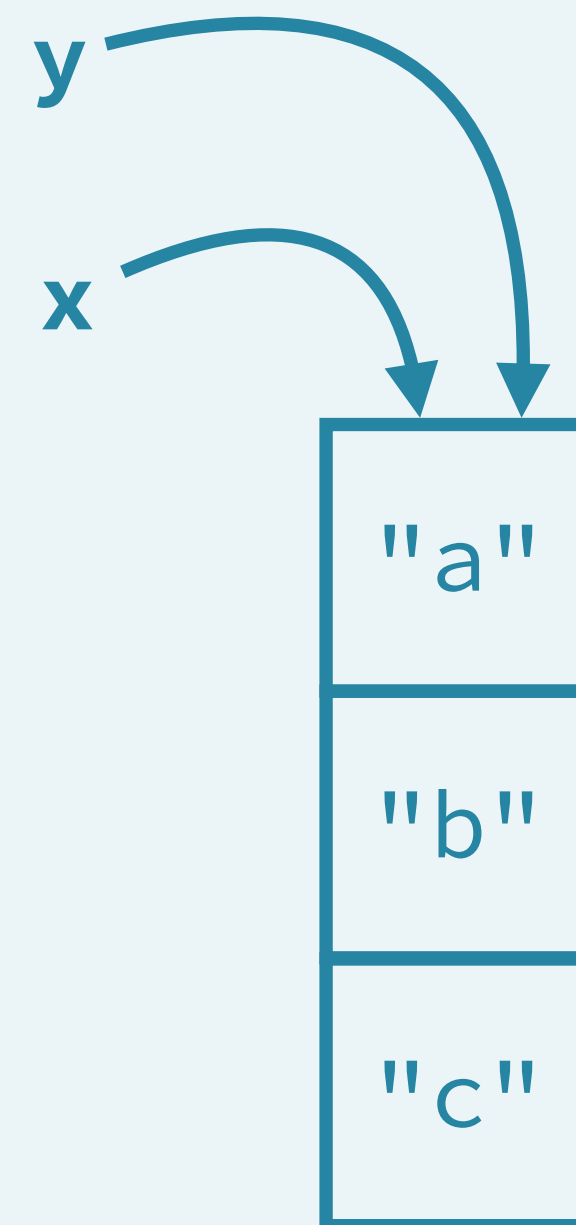
```
In [15]: y[1] = "z"
```

```
In [16]: y
```

```
Out[16]: ['a', 'z', 'c']
```

```
In [17]: x
```

```
Out[17]: ['a', 'z', 'c']
```



Behind the scenes (1)

```
In [13]: x = ["a", "b", "c"]
```

```
In [14]: y = x
```

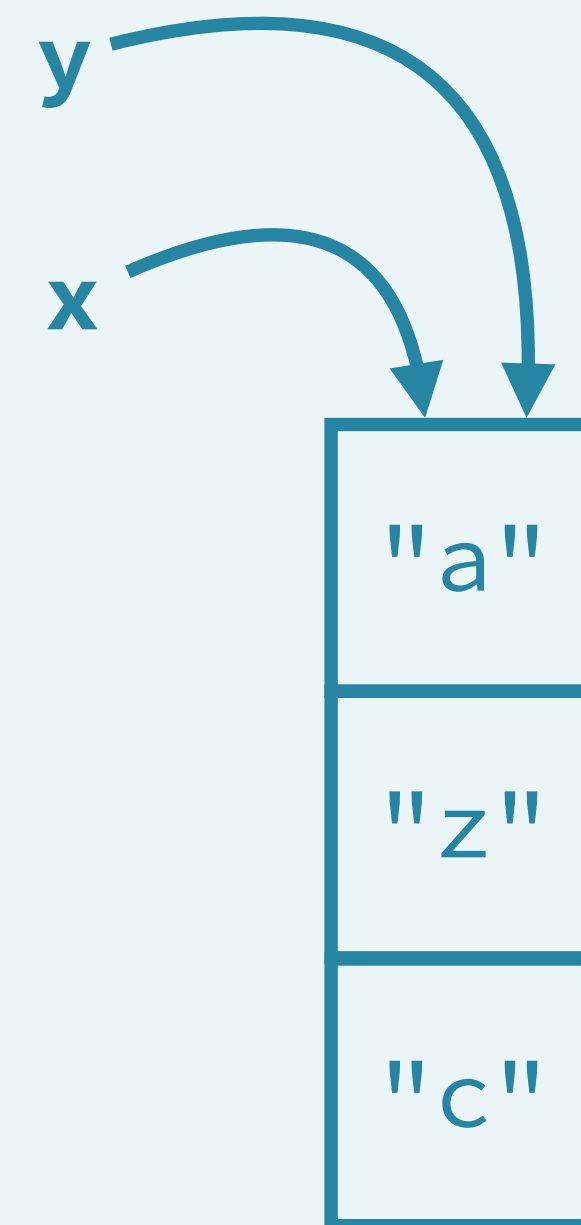
```
In [15]: y[1] = "z"
```

```
In [16]: y
```

```
Out[16]: ['a', 'z', 'c']
```

```
In [17]: x
```

```
Out[17]: ['a', 'z', 'c']
```



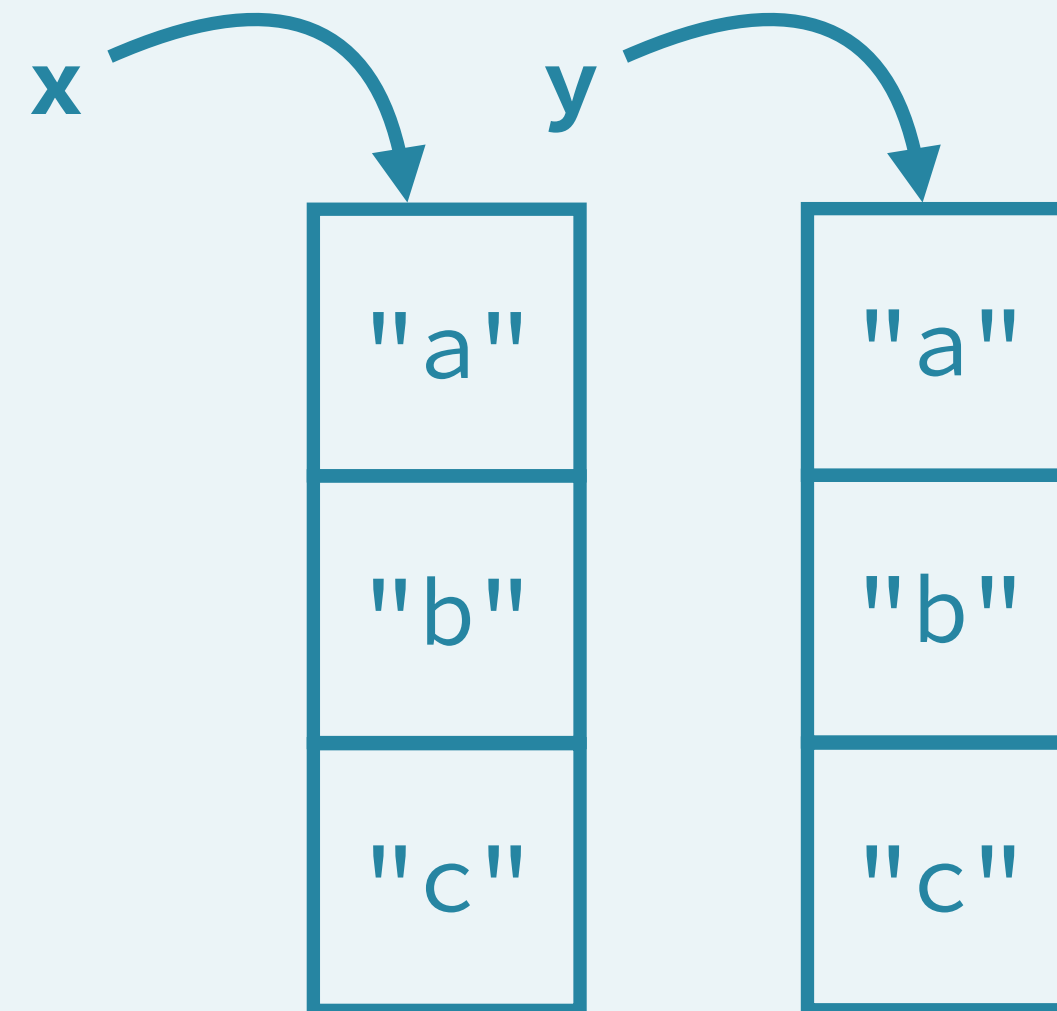
Behind the scenes (2)

```
In [18]: x = ["a", "b", "c"]
```

```
In [19]: y = list(x)
```

```
In [20]: y = x[:]
```

```
In [21]: y[1] = "z"
```



Behind the scenes (2)

```
In [18]: x = ["a", "b", "c"]
```

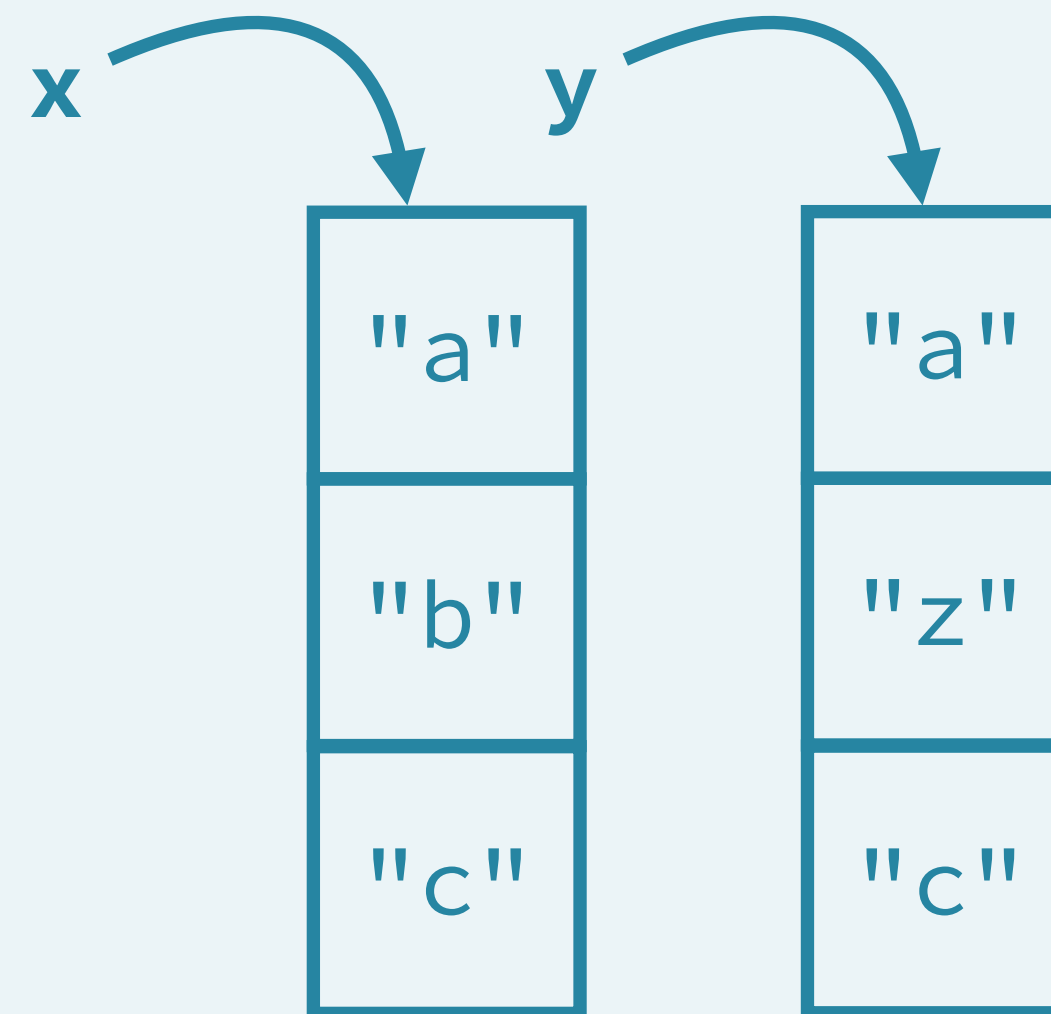
```
In [19]: y = list(x)
```

```
In [20]: y = x[:]
```

```
In [21]: y[1] = "z"
```

```
In [22]: x
```

```
Out[22]: ['a', 'b', 'c']
```





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Let's practice!