



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!**



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# 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])
```

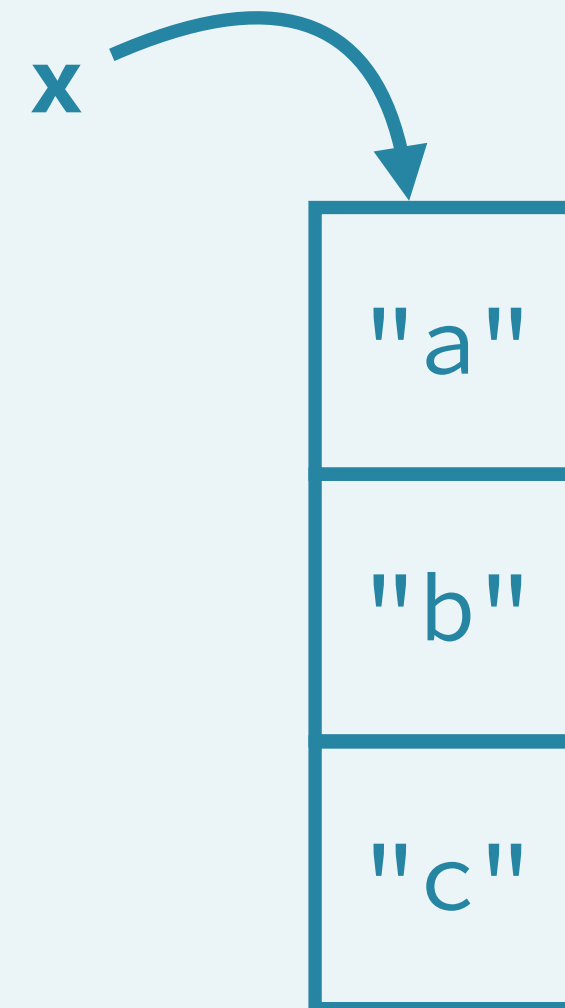
```
In [12]: fam
```

```
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
```

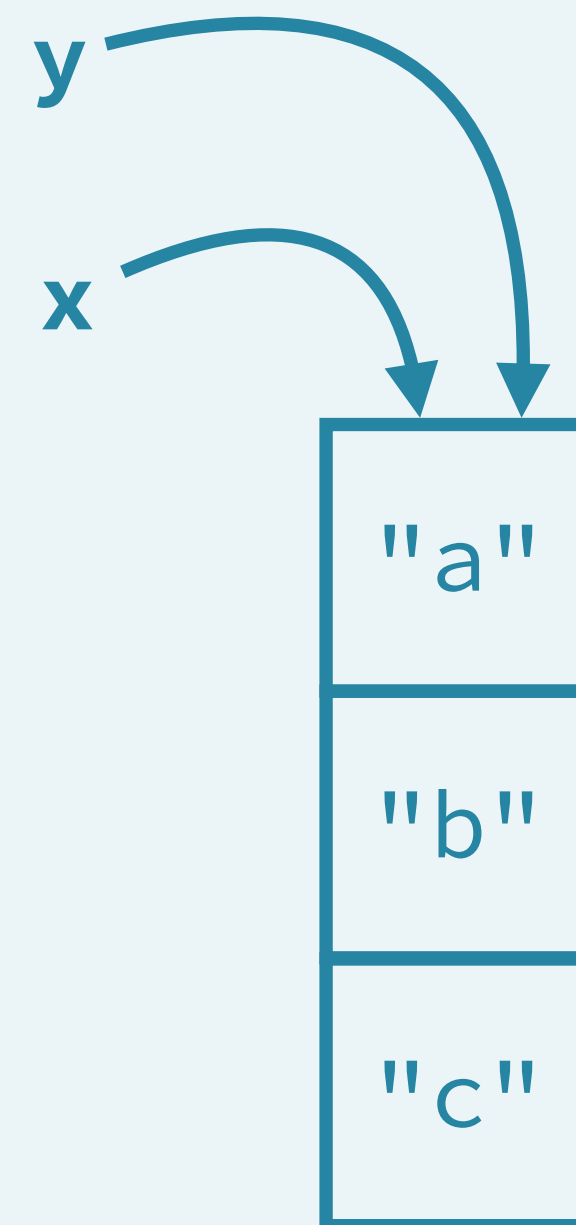
```
In [15]: y[1] = "z"
```

```
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
```

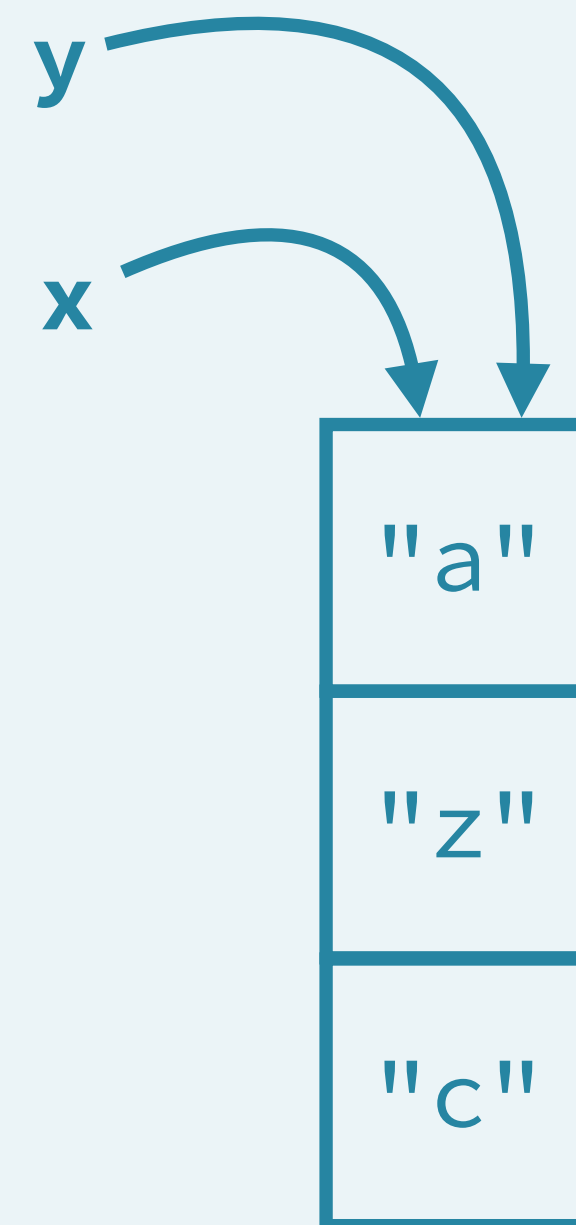
```
In [15]: y[1] = "z"
```

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

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

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

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



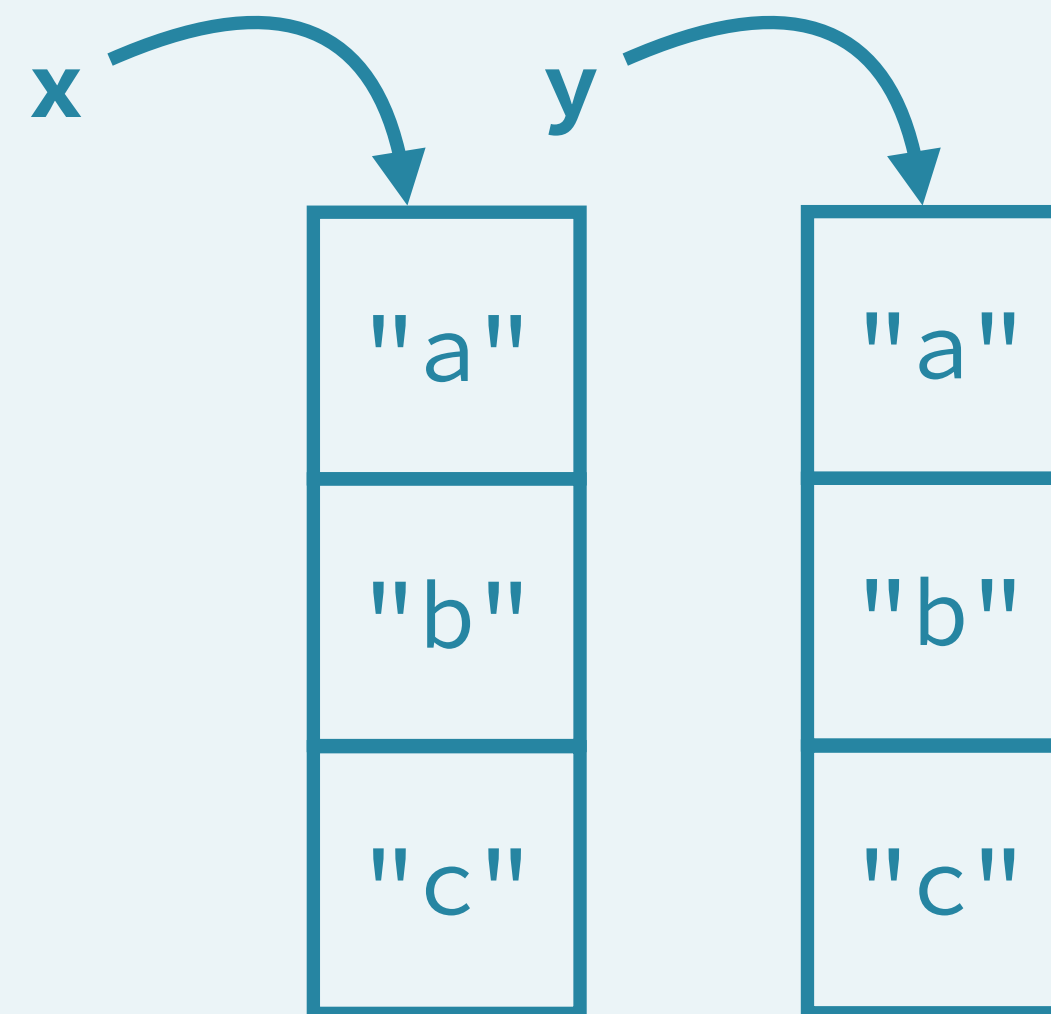
# Behind the scenes (2)

```
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"]
```

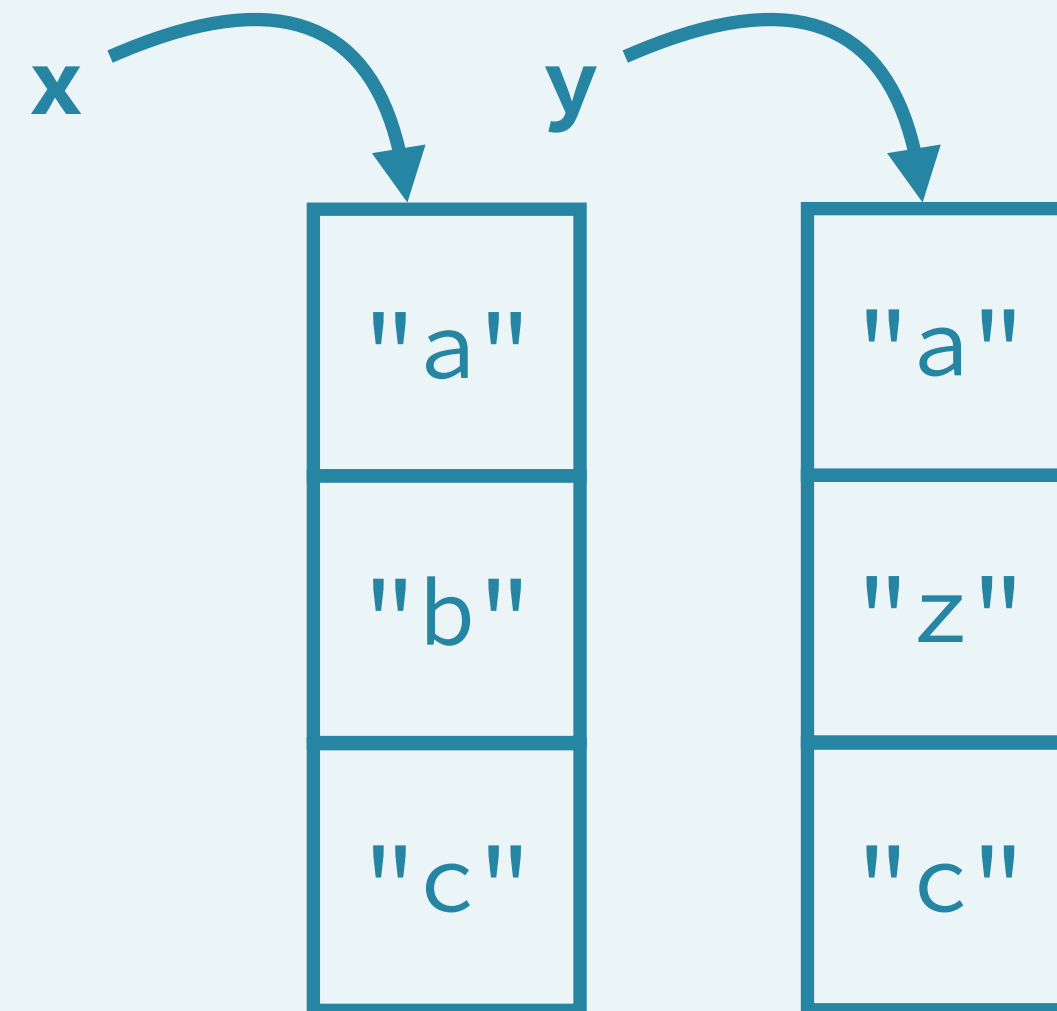
```
In [19]: y = list(x)
```

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

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

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

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





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