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Lecture 1
Organizing Code

Programming for Business Analytics
MG-GY 8401

Instructional Staff

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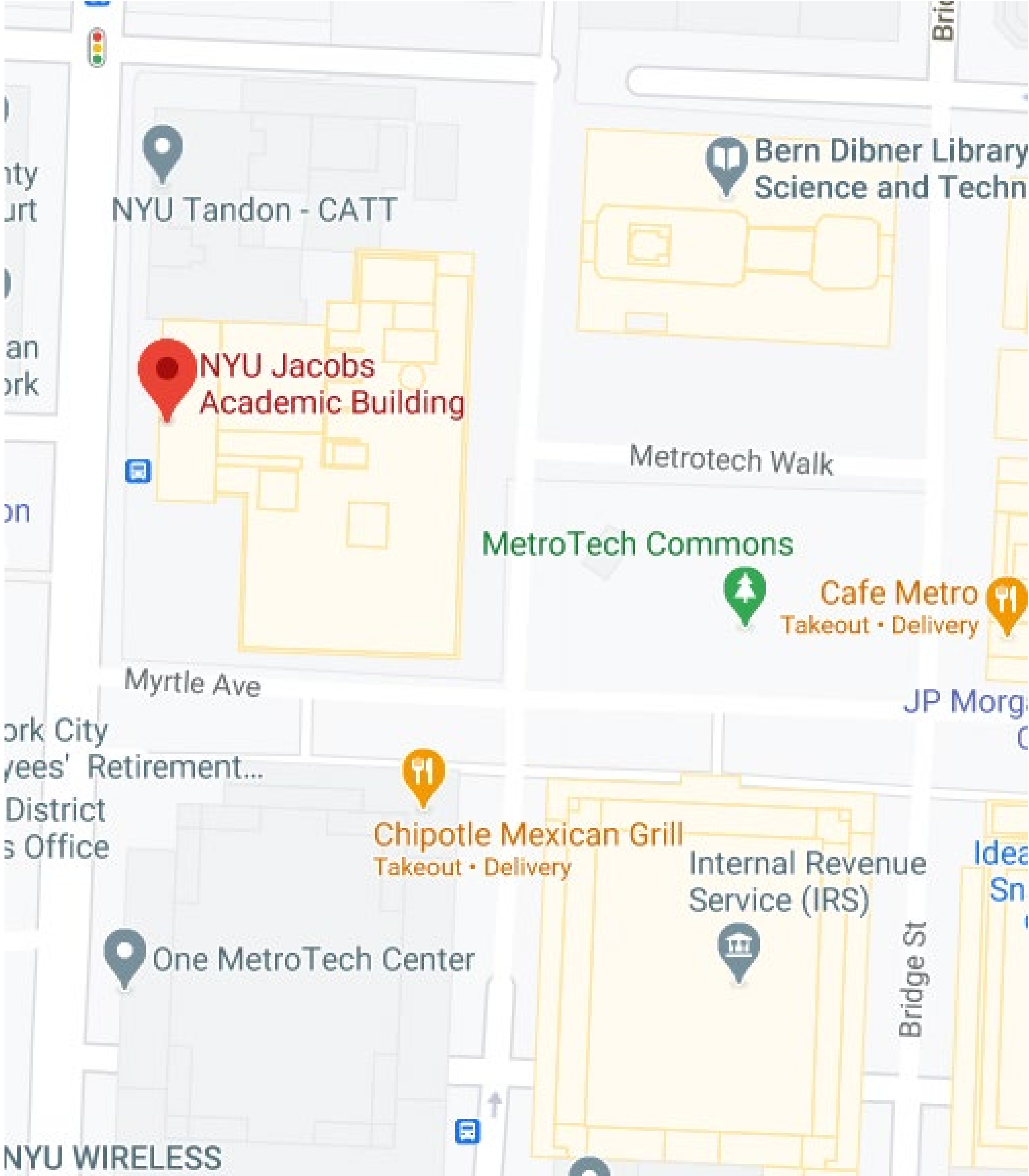
Technology Management and Innovation

Agenda

- Containers
  - List + Strings + Dictionaries
- Control Statements
  - Conditionals
  - Loops



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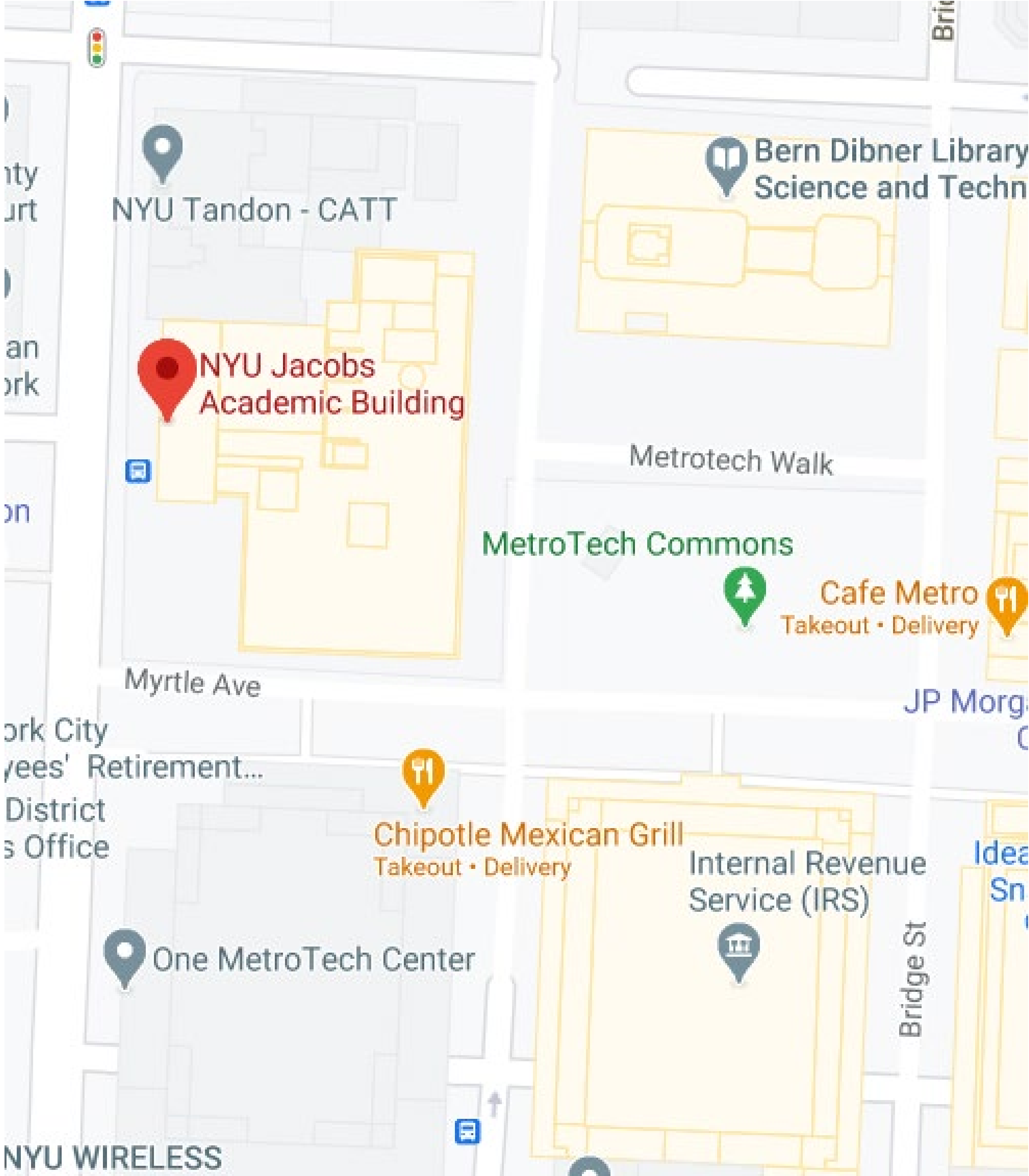
Logistics

- Educational Technology
  - JupyterHub
  - Slack
  - Gradescope



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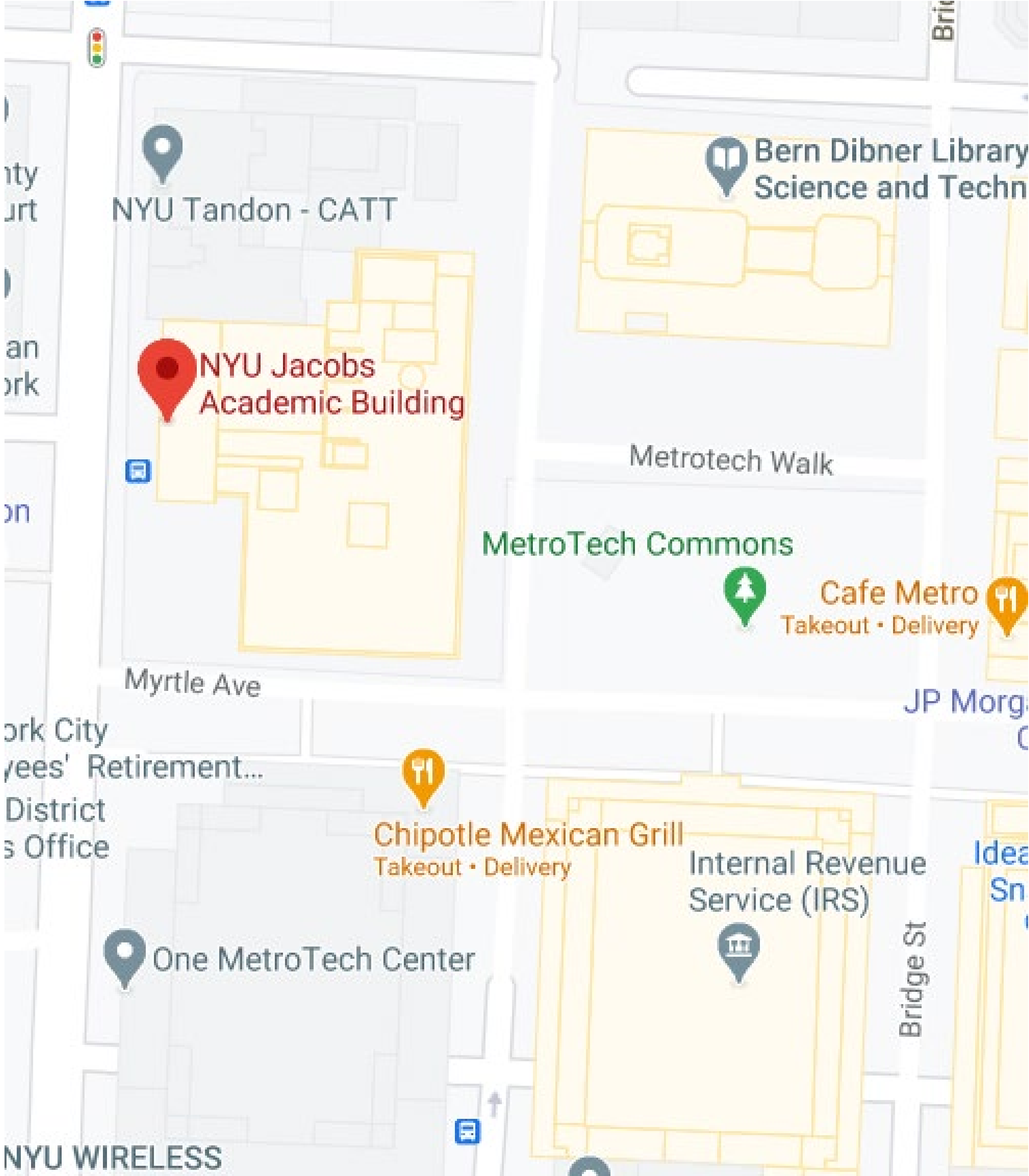
Logistics

- Lab
  - Saturday’s 3-4PM ET
- Homework
  - Homework 0
  - Homework 1



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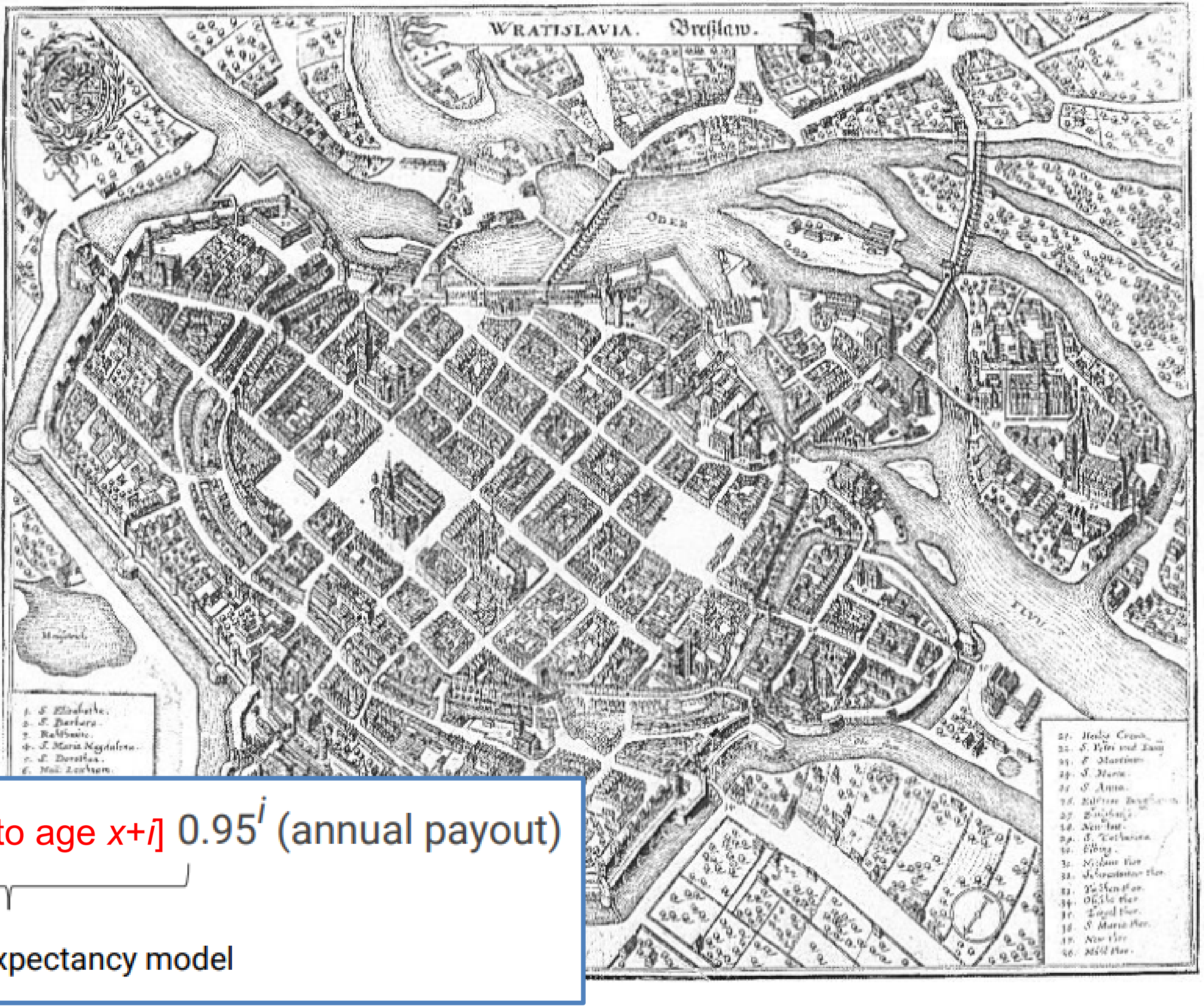
Logistics

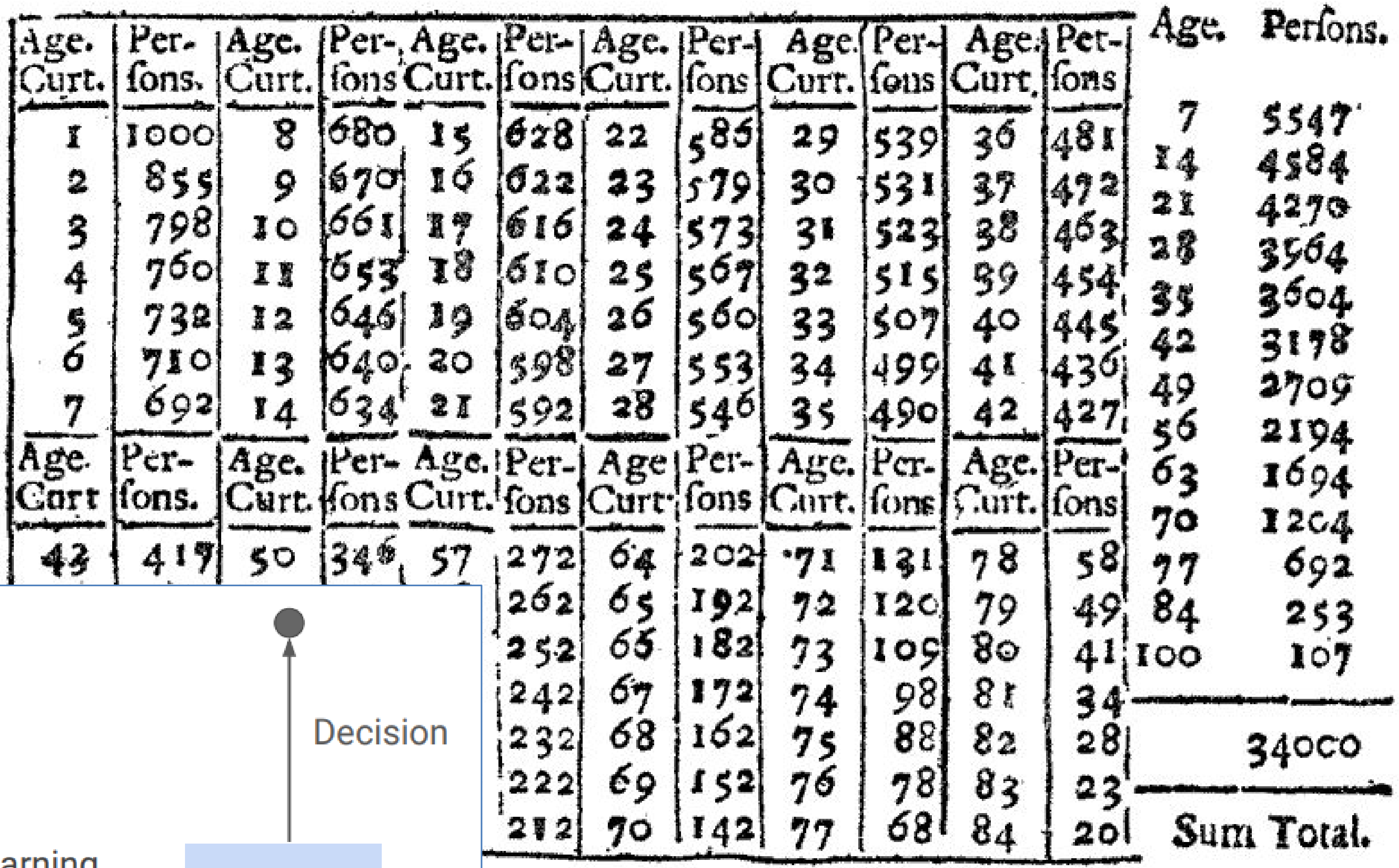
- Office Hours
  - Saturday’s 2-3PM ET
- Homework
  - Homework 0
  - Homework 1

What is Business Analytics?



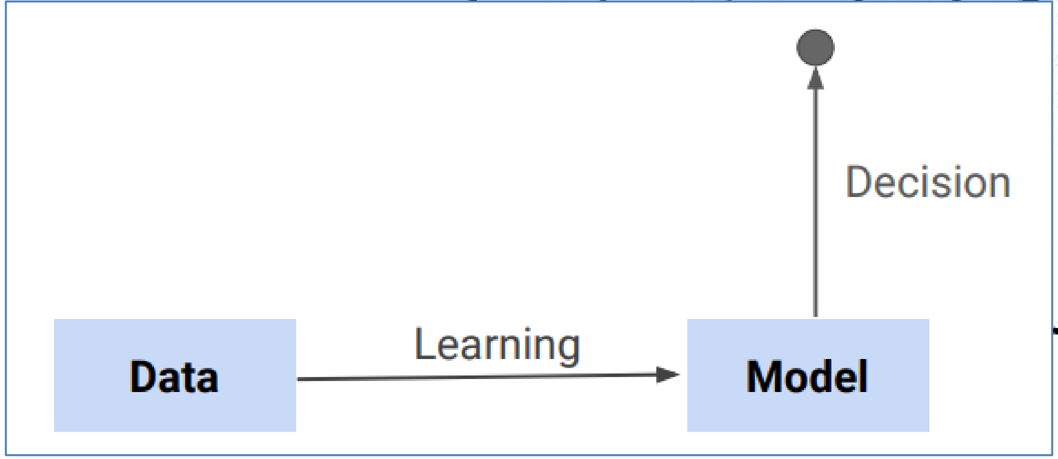
$$\text{Price at age } x = \sum_i \underbrace{P[\text{survive to age } x+i]}_{\text{Halley's life expectancy model}}\ 0.95^i\ (\text{annual payout})$$

What is Business Analytics?

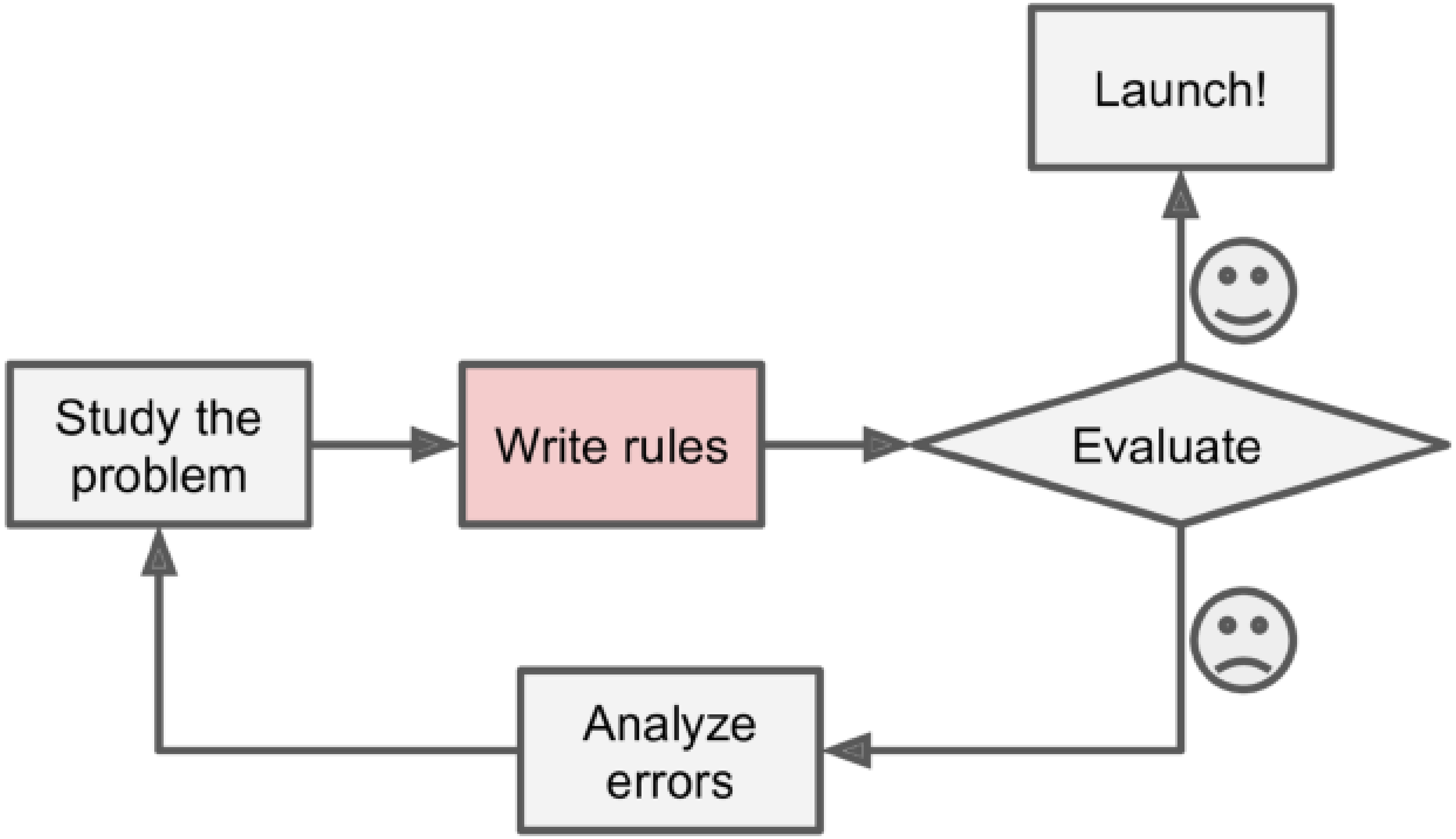


Age. Curt.	Per-ſons.	Age. Curt.	Per-ſons	Age. Curt.	Per-ſons	Age. Curt.	Per-ſons	Age. Curt.	Per-ſons	Age. Curt.	Per-ſons
1	1000	8	680	15	628	22	585	29	539	36	481
2	855	9	670	16	622	23	579	30	531	37	472
3	798	10	661	17	616	24	573	31	523	38	463
4	760	11	653	18	610	25	567	32	515	39	454
5	732	12	646	19	604	26	560	33	507	40	445
6	710	13	640	20	598	27	553	34	499	41	436
7	692	14	634	21	592	28	546	35	490	42	427
Age. Curt	Per-ſons.	Age. Curt.	Per-ſons	Age. Curt.	Per-ſons	Age Curt	Per-ſons	Age. Curt.	Per-ſons	Age. Curt.	Per-ſons
43	417	50	346	57	272	64	202	71	131	78	58
					262	65	192	72	120	79	49
					252	66	182	73	109	80	41
					242	67	172	74	98	81	34
					232	68	162	75	88	82	28
					222	69	152	76	78	83	23
					212	70	142	77	68	84	20

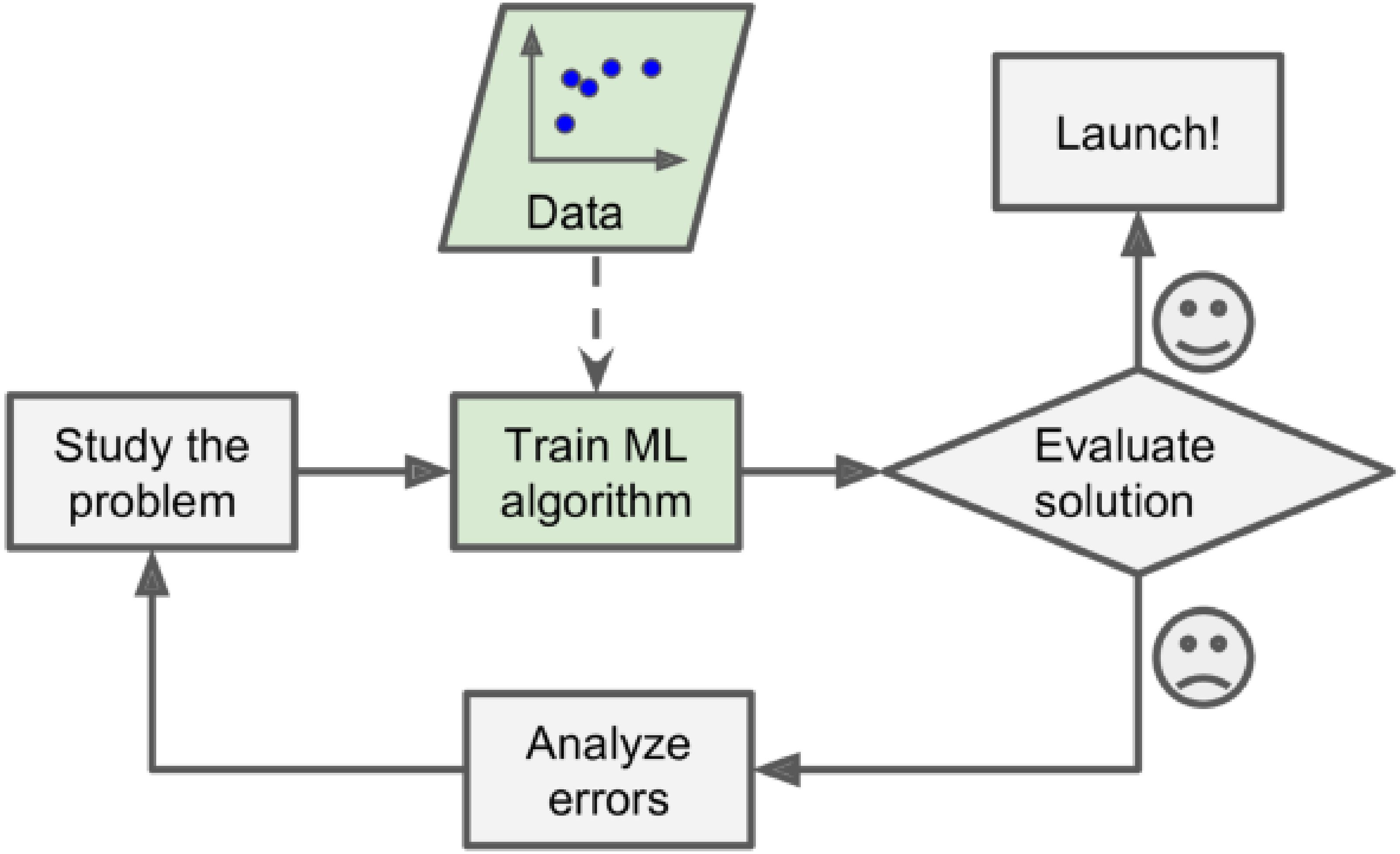
Age.	Perſons.
7	5547
14	4584
21	4270
28	3964
35	3604
42	3178
49	2709
56	2194
63	1694
70	1204
77	692
84	253
100	107
	34000
	Sum Total.



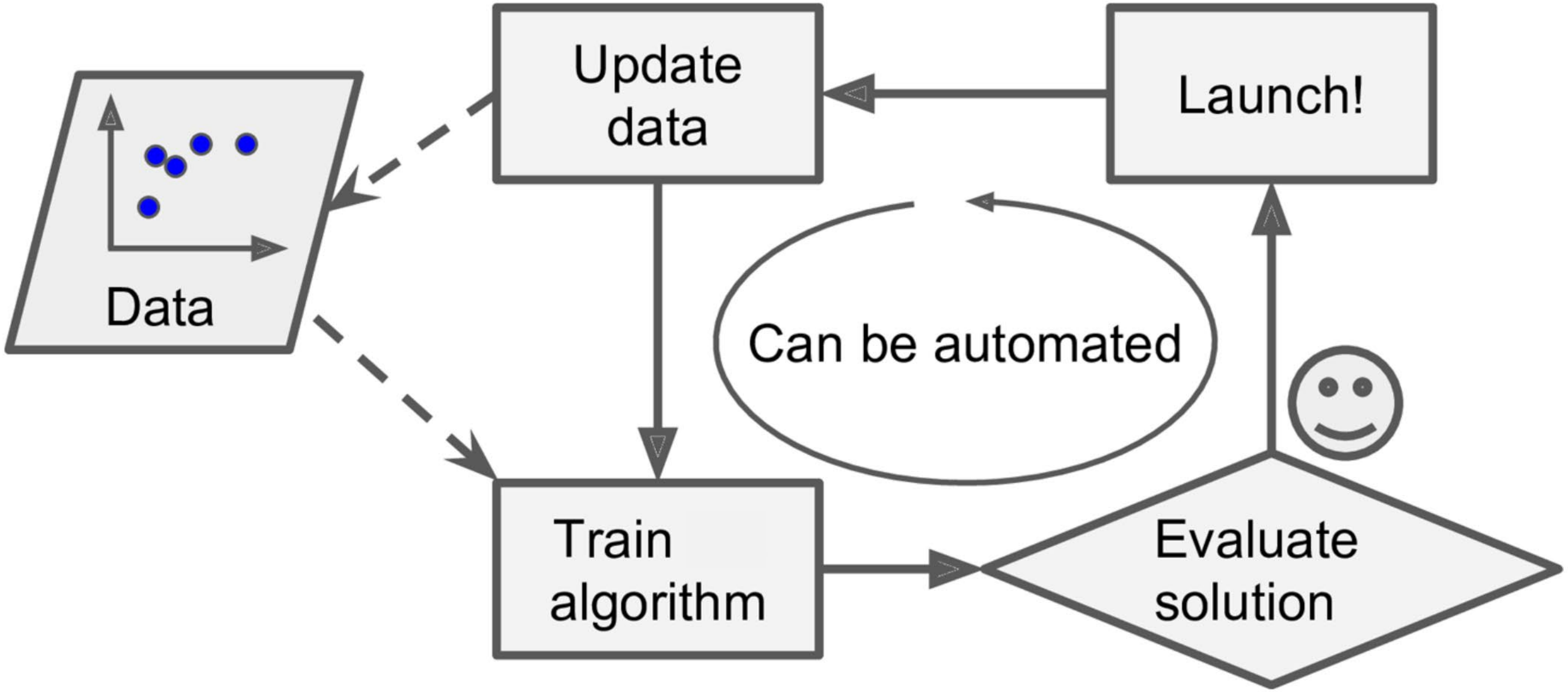
What is Business Analytics?

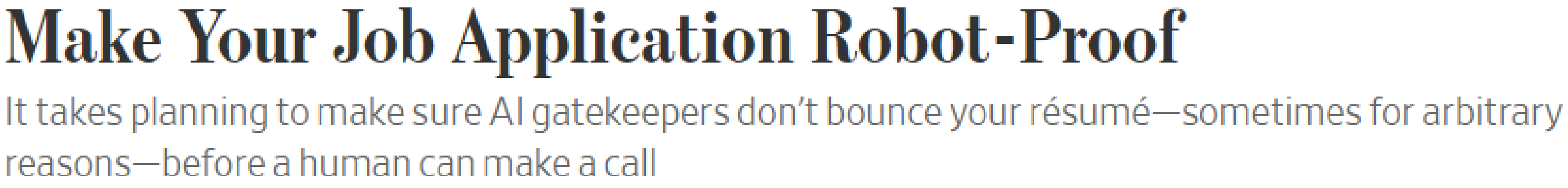


What is Business Analytics?



What is Business Analytics?

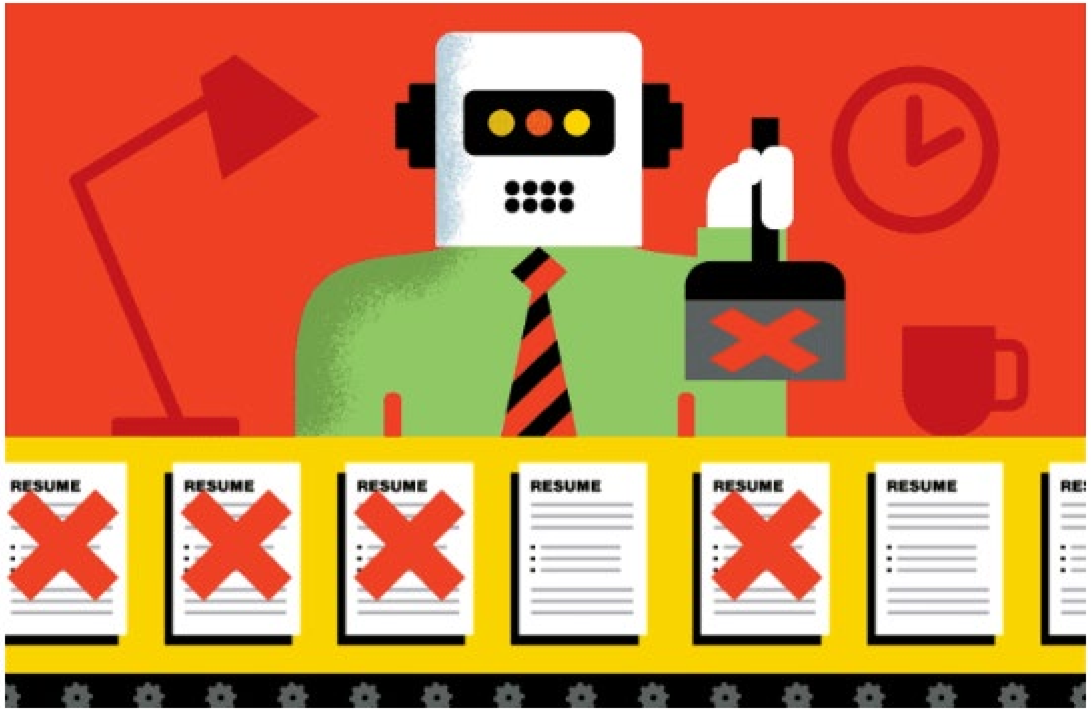




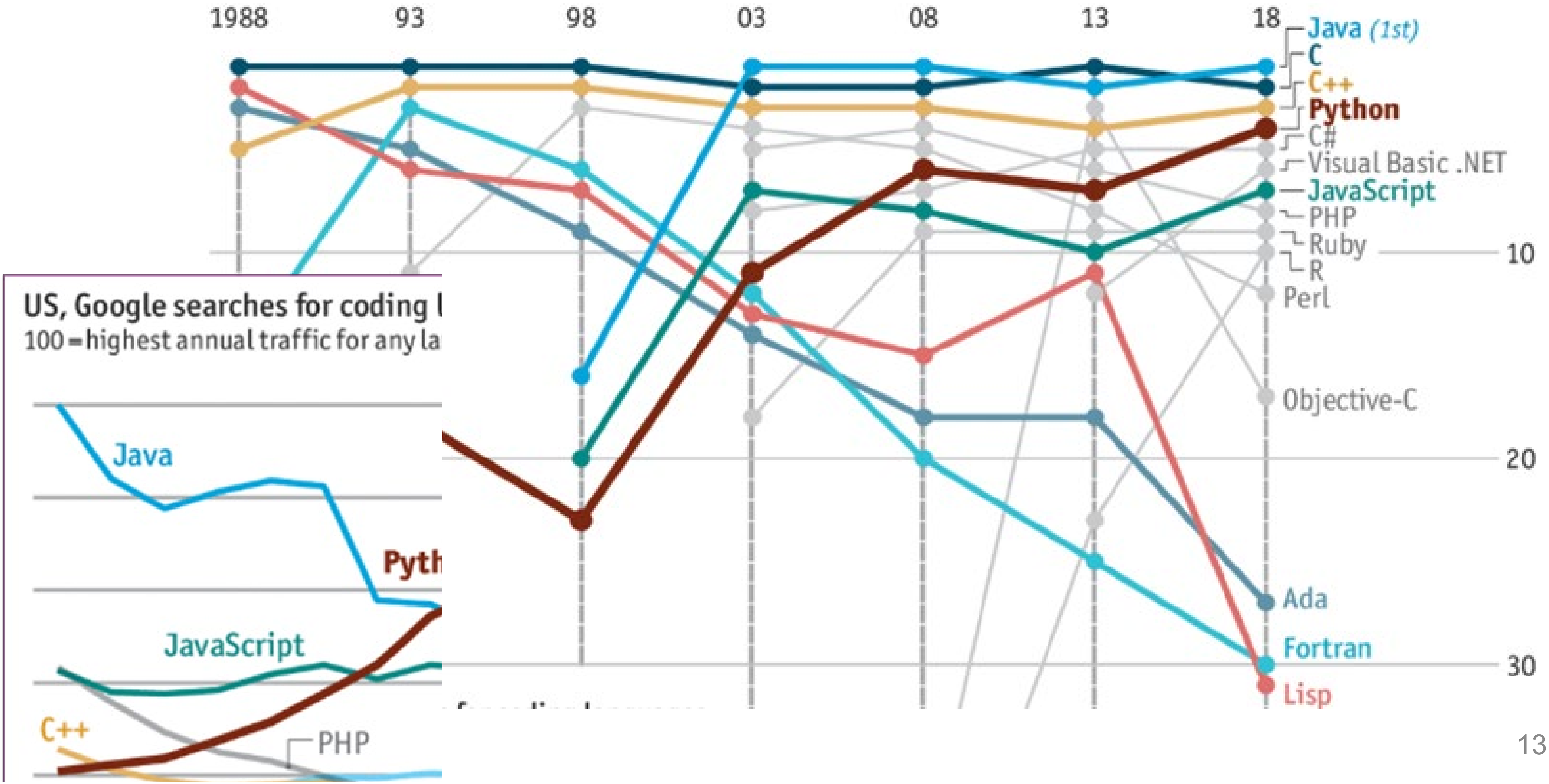
Make Your Job Application Robot-Proof

It takes planning to make sure AI gatekeepers don't bounce your résumé—sometimes for arbitrary reasons—before a human can make a call

"Often a job candidate doesn't even know a system is in use," and employers aren't required to disclose it, says Sarah Myers West, a researcher at the AI Now Institute, a New York University research group.



What is programming?



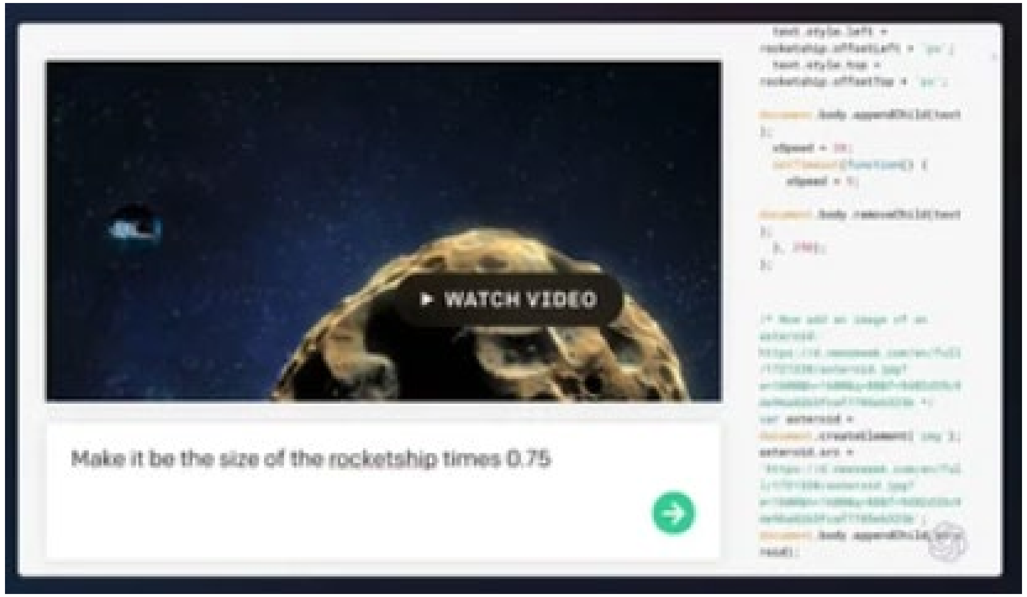
US, Google searches for coding l

100 = highest annual traffic for any la

'Learn to Write:' AI Advancements Mean Code Will Be Written in Natural English

Code is increasingly being written by AI directed with prompts written in standard English. 'Learn to Code' might increasingly become 'Learn to Write.'

By Chloe Xiang

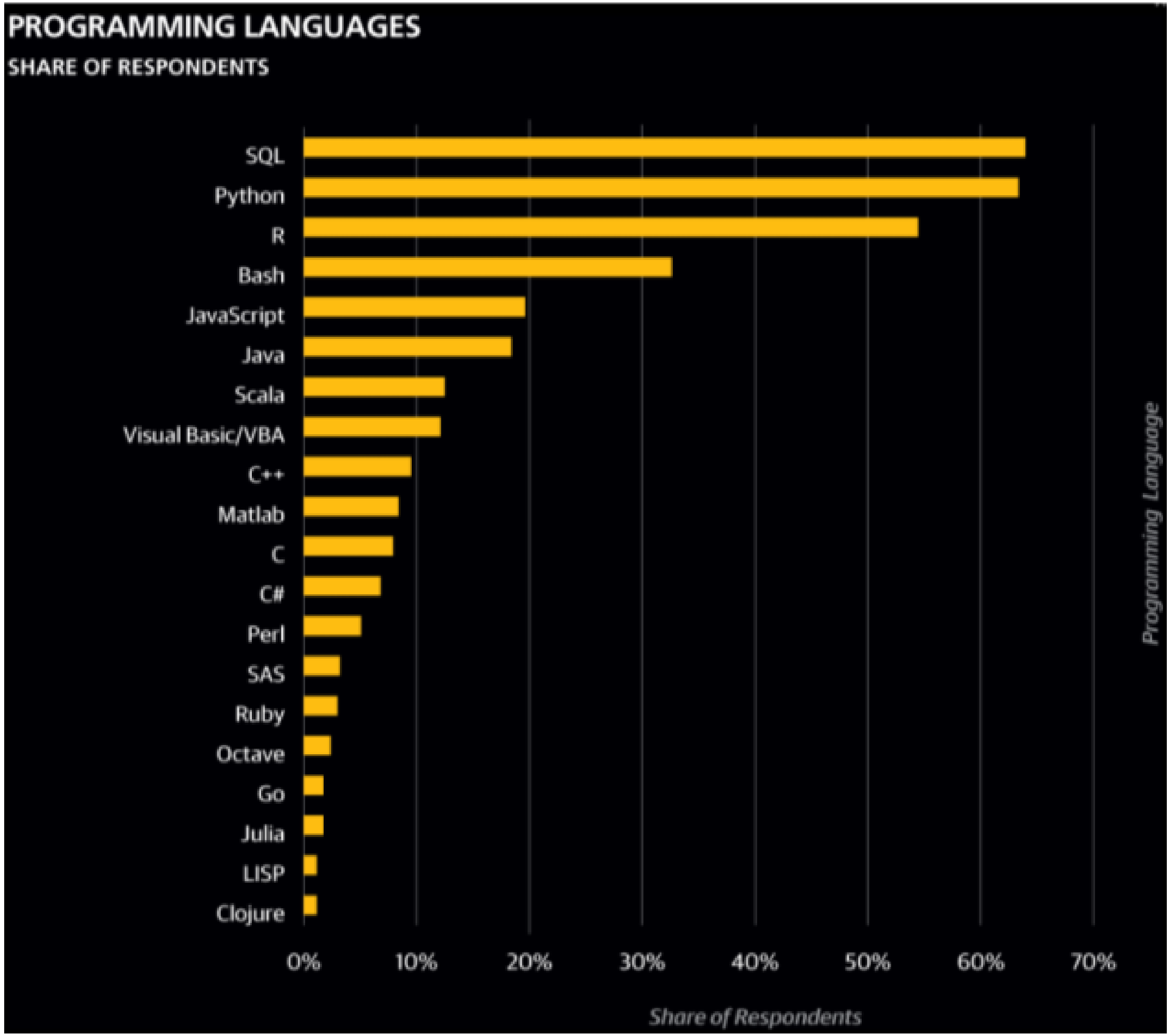


Make it be the size of the rocketship times 0.75

```
  text.style.left =
rocketship.offsetLeft + 'px';
  text.style.top =
rocketship.offsetTop + 'px';

document.body.appendChild(text
);
  xSpeed = 10;
  setTimeout(function() {
    xSpeed = 5;

document.body.removeChild(text
);
  }, 250);
});

/* Now add an image of an
asteroid:
https://i0.[illegible]
/[illegible]asteroid.jpg?
[illegible]
[illegible] */
var asteroid =
document.createElement('img');
asteroid.src =
'https://i0.[illegible]
[illegible]asteroid.jpg?
[illegible]
[illegible]';
document.body.appendChild(aste
roid);
```

What is programming?

“Only ugly languages become popular. Python is the one exception”



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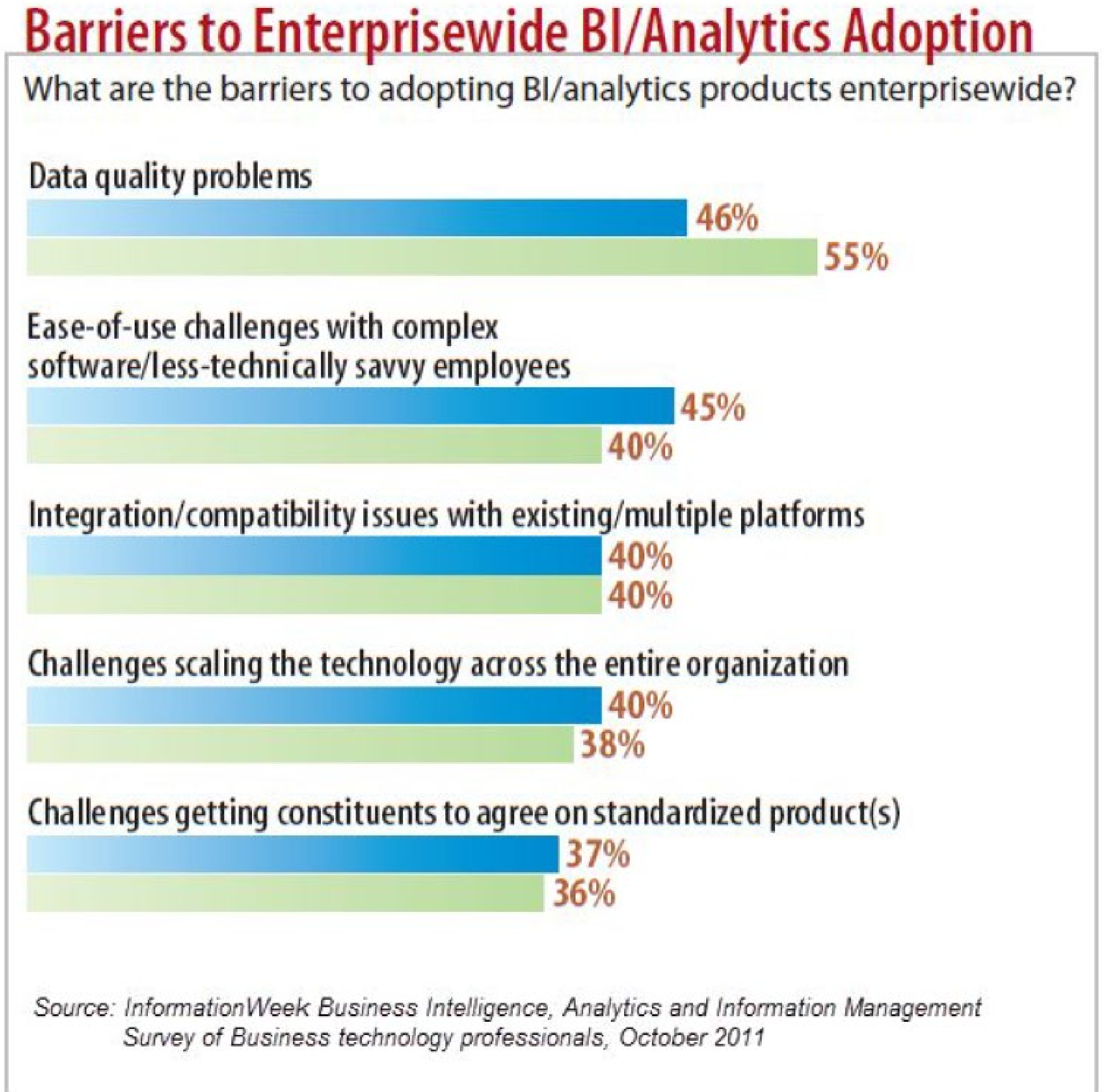
Why study programming?



Barriers to Enterprisewide BI/Analytics Adoption

What are the barriers to adopting BI/analytics products enterprisewide?

Source: InformationWeek Business Intelligence, Analytics and Information Management Survey of Business technology professionals, October 2011

> *"Everyone should know how to program a computer, because it teaches you how to think."*

Poll

What have you heard about Python?

A. It’s useful for analyzing data.

B. It’s useful for scripting.

C. I will have to use it in class.

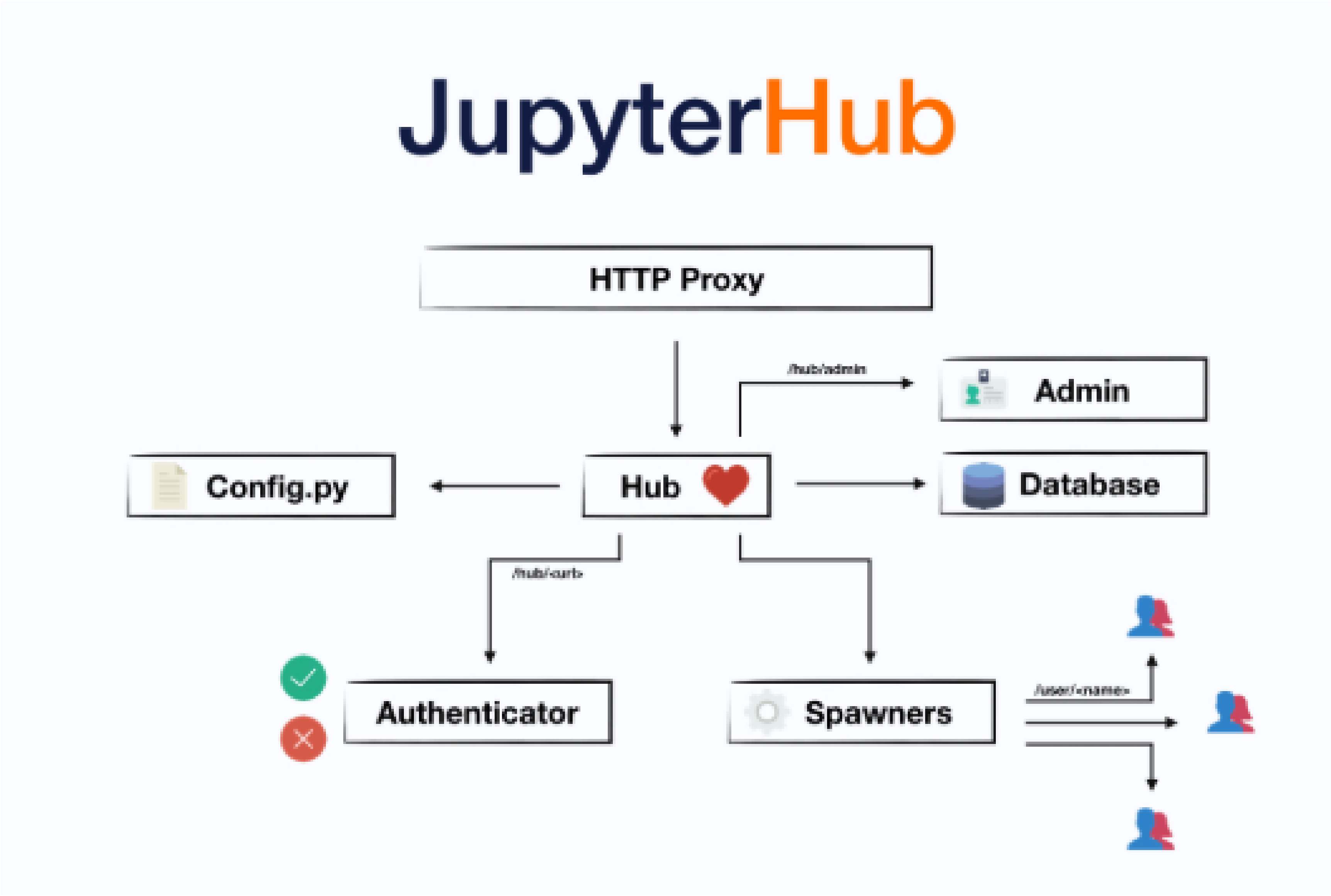
D. I will have to use it on the job.

E. Why are you asking about snakes?

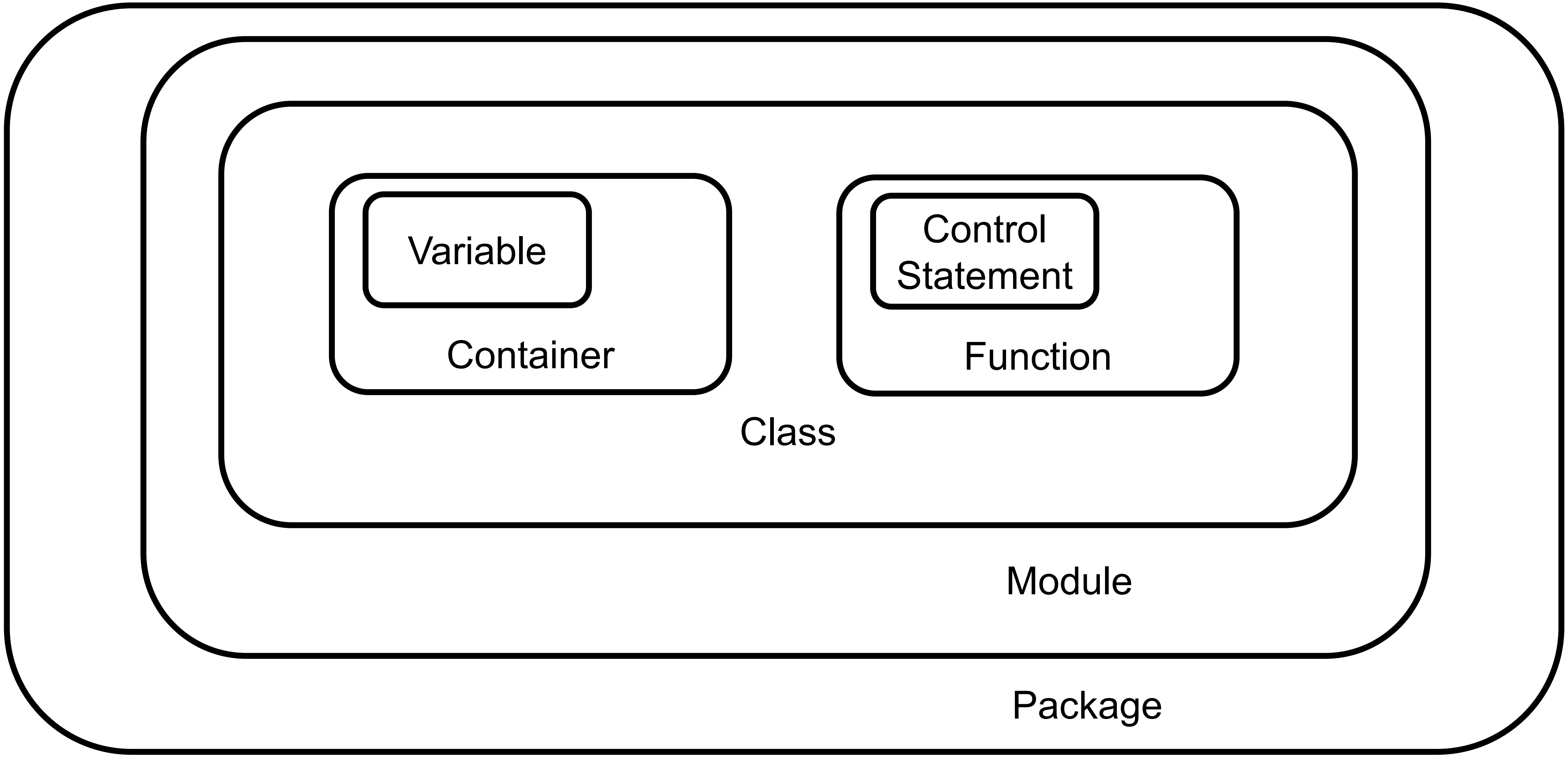
What is Python?

What is Python?

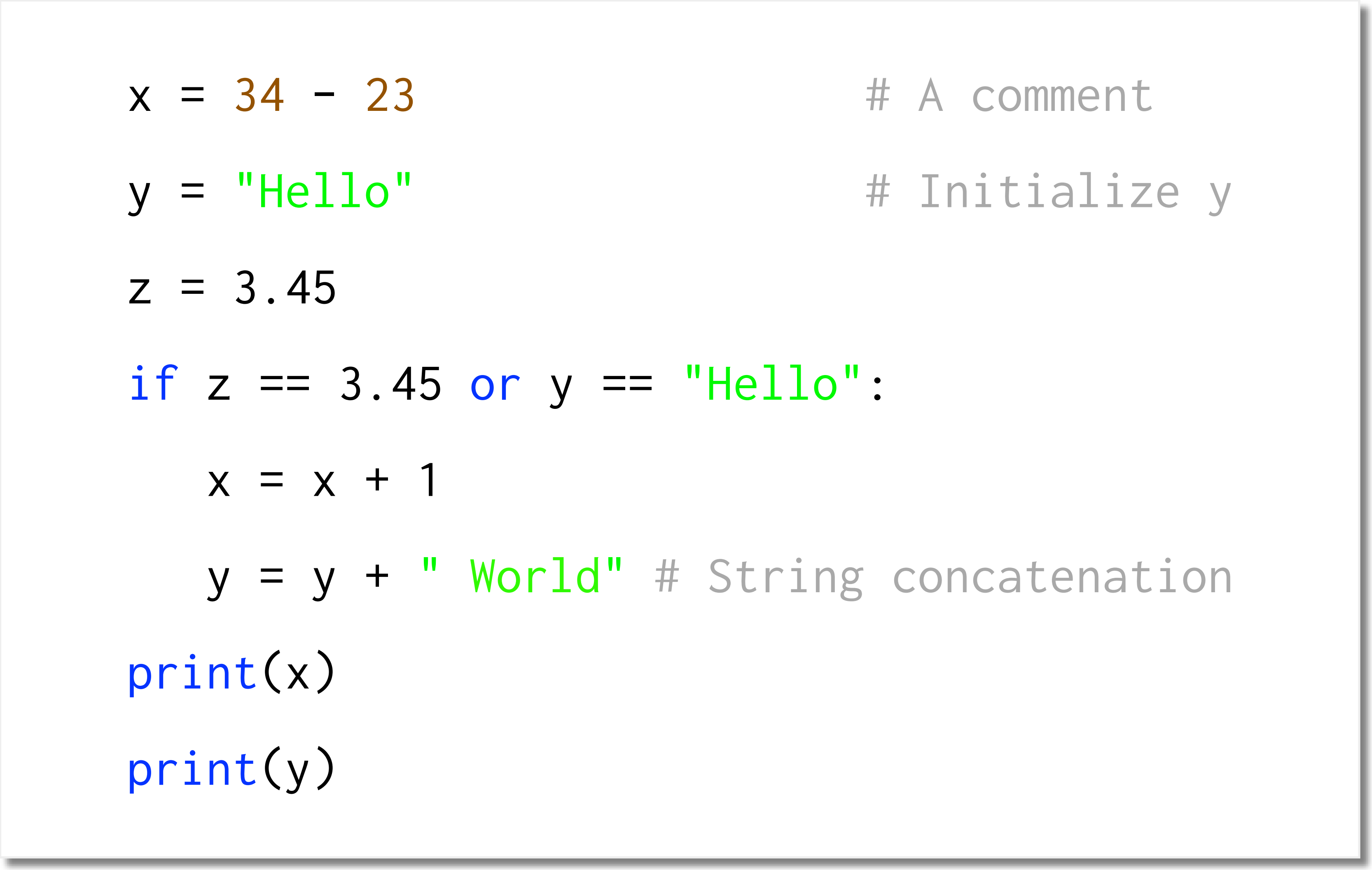
What is Python?



Organizing Data



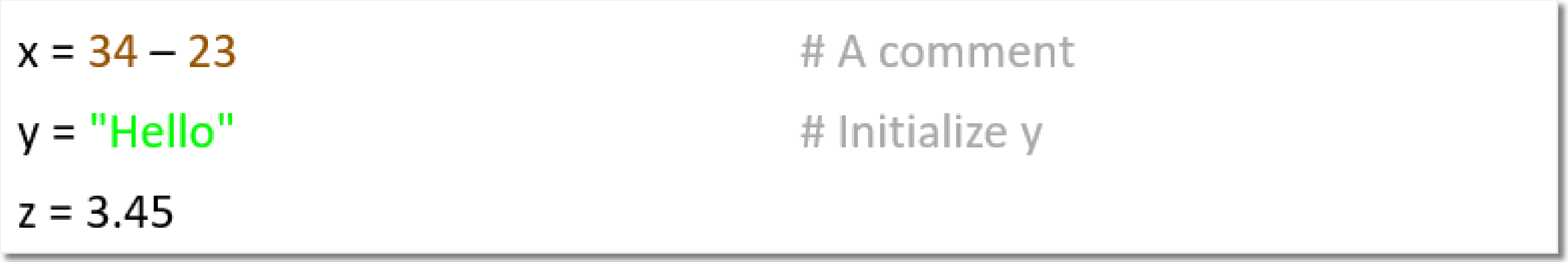
Breakout Room



```python
x = 34 - 23                 # A comment
y = "Hello"                 # Initialize y
z = 3.45
if z == 3.45 or y == "Hello":
    x = x + 1
    y = y + " World" # String concatenation
print(x)
print(y)
```

Example

- There is no need to declare the types of variables, parameters, or methods



```
x = 34 – 23                 # A comment
y = "Hello"                 # Initialize y
z = 3.45
```

- Python will work out the type of the variable when needed

Example

- The assignment creates and initializes the variables

```
y = "Hello"                             # Initialize y
```

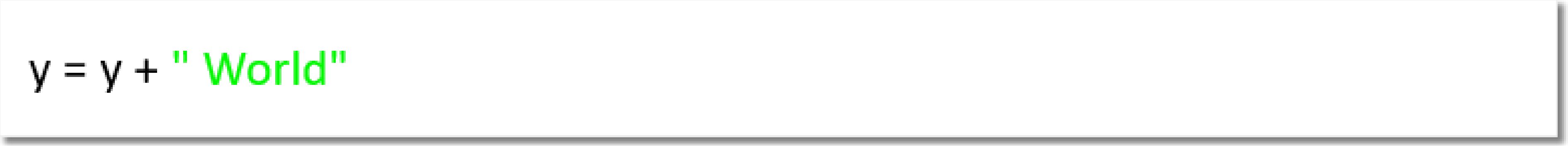
- The string "Hello" is created and "assigned" to y

- Comparison uses normal operators <, >, ==, etc.
- Logical operators are and, or, not, *not* symbols
- Normal rules of precedence

```
z == 3.45 or y == "Hello"
```

Example

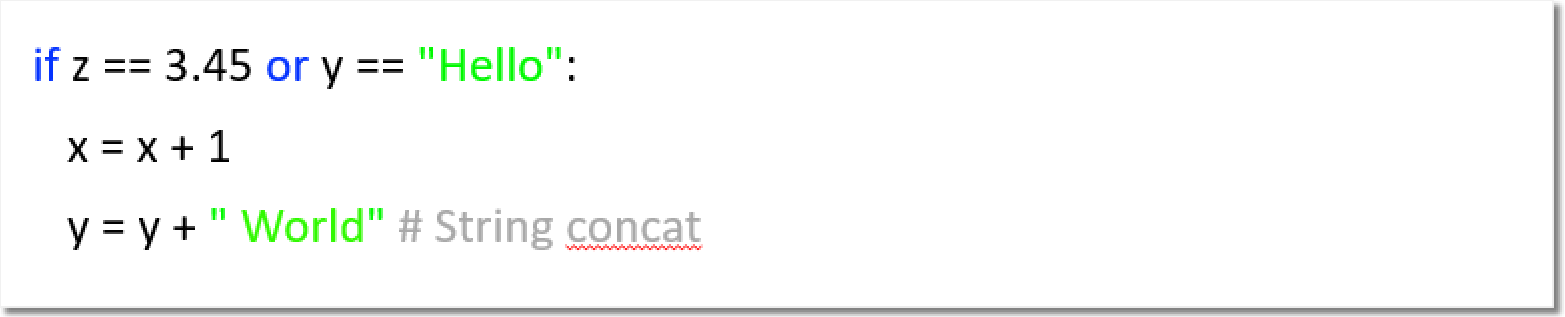
- Strings can be concatenated using the + operator



```
y = y + " World"
```

- Creates a new string comprising the contents of y with " World" appended to the end

- Indentation is used to denote blocks of code rather than braces



```
if z == 3.45 or y == "Hello":
   x = x + 1
   y = y + " World" # String concat
```

Data Types

- Integer

  42, int(4/3) # result is 1

- Floating point

  3.14, 3.14e-10, .0001, 4.

- Imaginary & Complex

  3j, 4+5j

- Boolean

  True, False

- Built-in functions for converting between types

String Literals

- Can use either "" or '' for literals
- Unmatched quote is valid in a string

```
"It's"
```

- Triple quotes are used for multi-line strings or for containing both types of quotes

```
"""It's "his""""
```

Indentation

- Code indentation is very important in Python
- Lines at the same level of indentation form a block
  - Like braces { } in C or Java
  - The indent level is the number of leading spaces
  - Tabs are replaced by one to eight spaces, rounding up to a multiple of eight
- Each statement comprises a single line
  - A backslash \ must be used to split a statement
- Often a colon appears at the start of a new block
  - E.g. if statements and functions

Comments

- Comments can be placed almost anywhere
- Start with a #, rest of line is ignored
- Finish at the end of the current line
- Cannot be part of a string or after a backslash

Assignment

- If you try to access a variable before it has been properly created, you'll get an error

```
>>> y
Traceback (most recent call last):
  File "<pyshell#16>", line 1, in -toplevel- y
NameError: name ‘y' is not defined
```

- A variable must first be created by putting it on the left side of an assignment

```
>>> y = 3
>>> y
3
```

Assignment

- Names are case sensitive
- Names cannot start with a number
- Can contain letters, numbers, and underscores

bob   Bob   _bob   _2_bob_   bob_2   Bob

- There are some reserved words

and, assert, break, class, continue, def, del, elif, else, except, exec, finally, for, from, global, if, import, in, is, lambda, not, or, pass, print, raise, return, try, while

Containers

- **Tuple**
  - A simple ordered sequence of items
  - Elements can be of mixed types, including sequence types
  - Elements cannot be modified
- **List**
  - Ordered sequence of items of mixed types
  - Elements can be modified, added, removed, etc.
- **String**
  - Conceptually very much like a tuple
  - Elements are restricted to characters only

Containers

- Tuples are defined using parenthesis and commas

```
>>> (23, 'abc', 4.56, (2,3), ‘def’)
>>> (1, 2, 3, 4)
>>> tu = (‘a’, ‘b’) # give it a name
```

- Lists are defined using square brackets and commas

```
>>> ["abc", 34, 4.34, 23]
>>> [(1, 2), (3, 4)]  # list of tuples
>>> li = [‘a’, 1]     # give it a name
```

- Strings are defined using since or double quotes

```
>>> "Hello World"
>>> '"Hello World”'  # string containing quotes
>>> st = """This is a multi-line
string that uses triple quotes"""
```

Containers

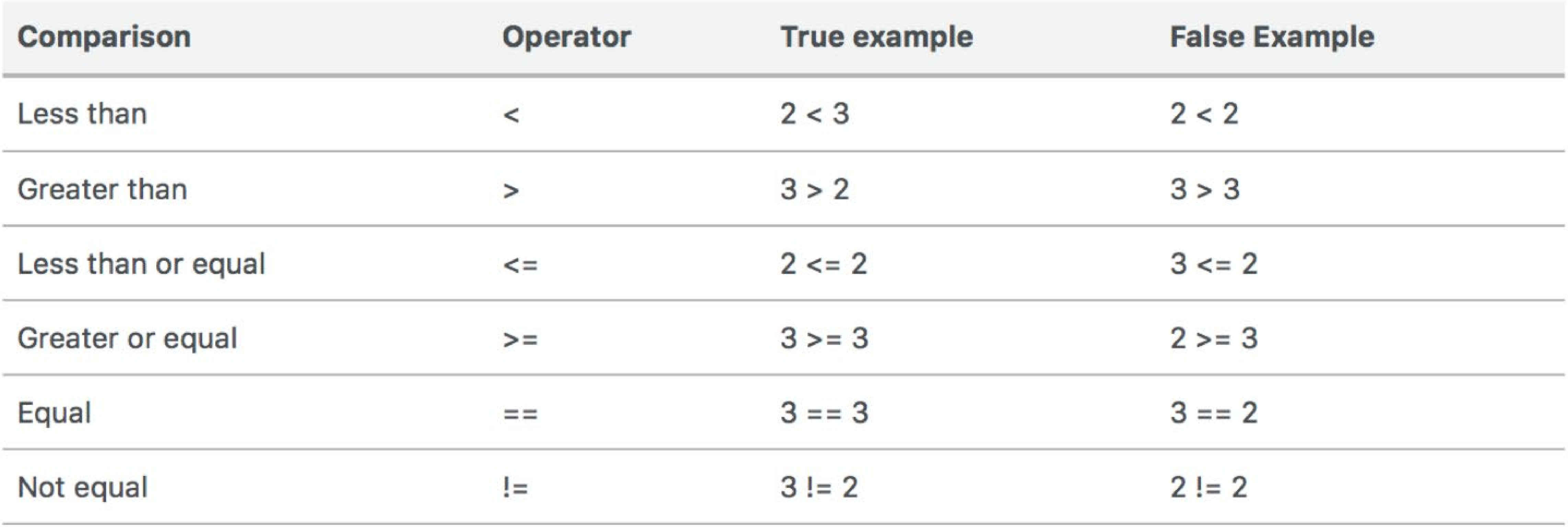
- Dictionaries store an unordered mapping between a set of keys and a set of values
  - Keys can be any immutable type
  - Values can be any type
  - A single dictionary can store values of different types
- You can define, modify, view, look up, and delete the key-value pairs in the dictionary

Containers

- Created using braces, ‘{’ and ‘}’
- Each element specifies the key and value

```
>>> d = {'user':'fred', 'pswd':1234}
>>> d
{'user': 'fred', 'pswd': 1234}
```

Logical Operators



Comparison	Operator	True example	False Example
Less than	<	2 < 3	2 < 2
Greater than	>	3 > 2	3 > 3
Less than or equal	<=	2 <= 2	3 <= 2
Greater or equal	>=	3 >= 3	2 >= 3
Equal	==	3 == 3	3 == 2
Not equal	!=	3 != 2	2 != 2

In what order does Python interpret logical operators?

A. AND, OR, NOT

B. NOT, AND, OR

C. OR, AND, NOT

D. AND, NOT, OR

In what order does Python interpret logical operators?

A. AND, OR, NOT

B. NOT, AND, OR

C. OR, AND, NOT

D. AND, NOT, OR

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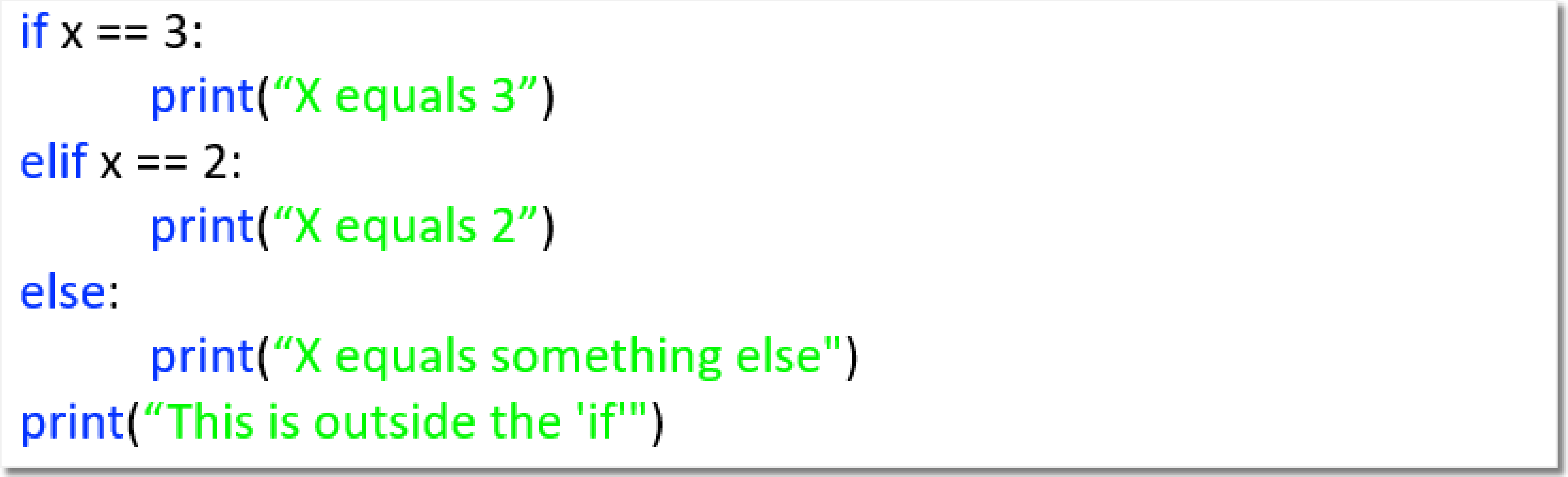
Conditional Statements

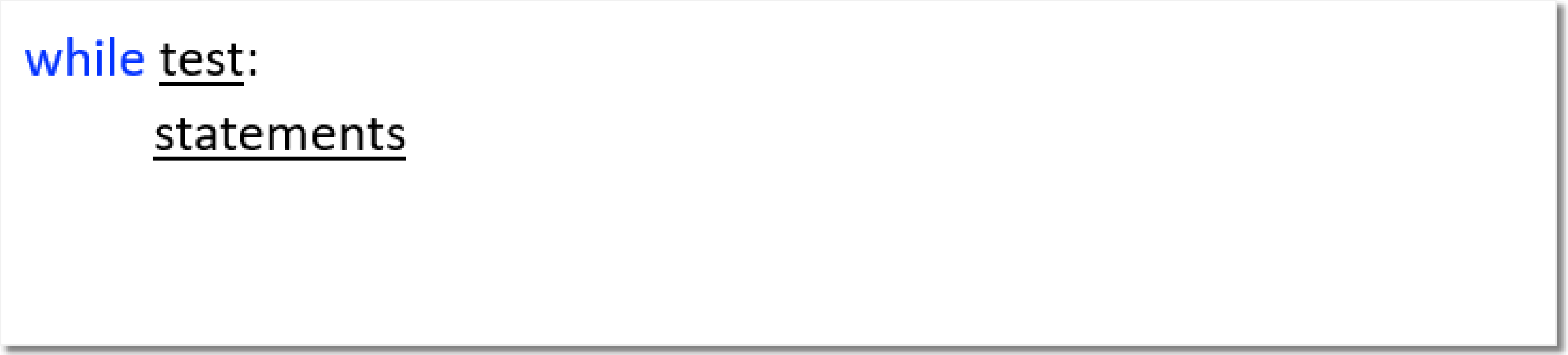
- `if` is the main statement for selecting alternatives

- 

```
if x == 3:
        print(“X equals 3”)
elif x == 2:
        print(“X equals 2”)
else:
        print(“X equals something else")
print(“This is outside the 'if'")
```

Loops

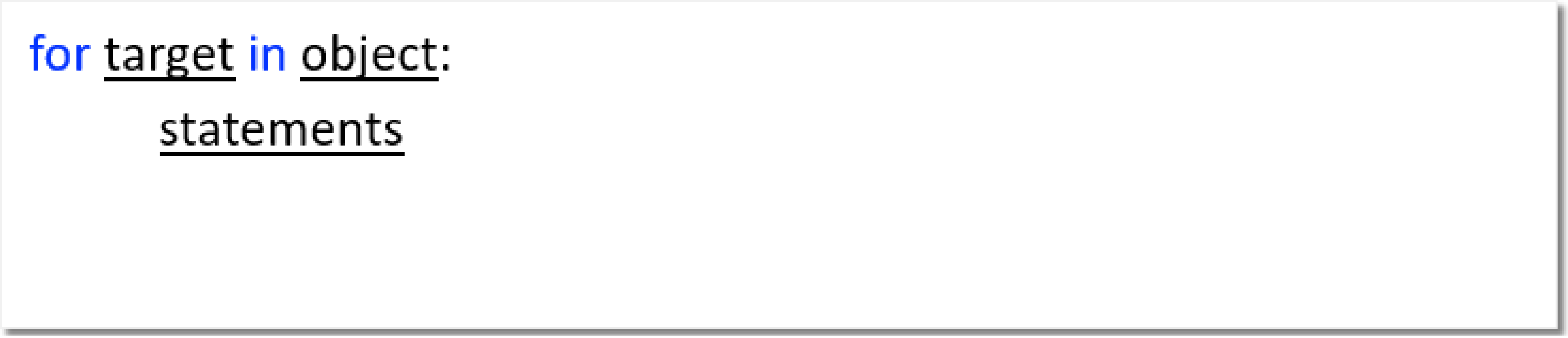
- A looping statement is used to execute the same block of code repeatedly
- The number of loops is determined by
  - A condition in much the same way as the ‘if’ statement
  - Iterating over an object with a fixed number of elements



```
while test:
        statements
```

Loops

- A looping statement is used to execute the same block of code repeatedly
- The number of loops is determined by
  - A condition in much the same way as the ‘if’ statement
  - Iterating over an object with a fixed number of elements



```
for target in object:
        statements
```

Variables

- Store Data

Containers

- Combine Variables

Conditionals

- Conditionally Execute Procedure

Loops

- Repeat Procedure

References

- Lubanovic, *Introducing Python* (Chapters 4,5,6,7,8)

Questions

- Describe the learning objectives.
- Summarize the relevant take-aways.
- Ask about unclear information.