

Lesson 3

CSV &

Higher-Order Functions

Programming Fundamentals in Python

Lesson 2 Recap

- Homework: “What Number Am I Thinking Of?”
- Bonus: Zipcode Statistics

Class Materials

github.com/DavidYKay/python-fundamentals

Today's Goal

- Implement an adventure game

Adventure Game Demo

Breakdown

- Dictionaries
- Text Parsing
- CSV Parsing
- Higher-order Functions

Dictionaries

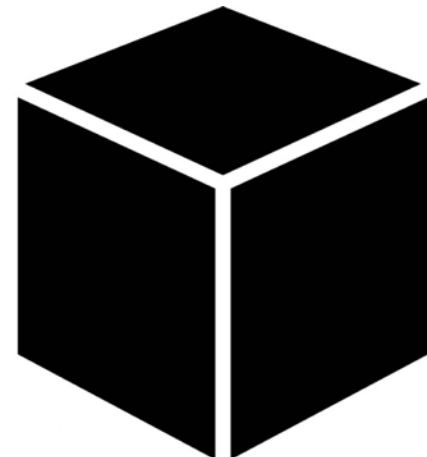
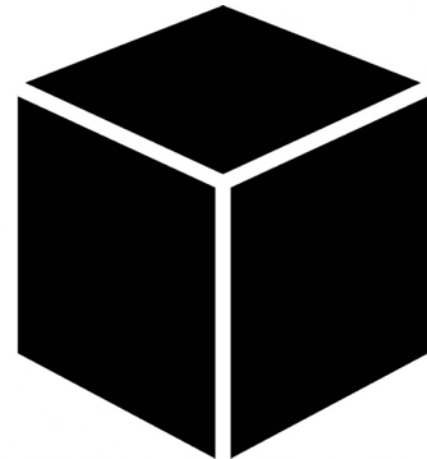
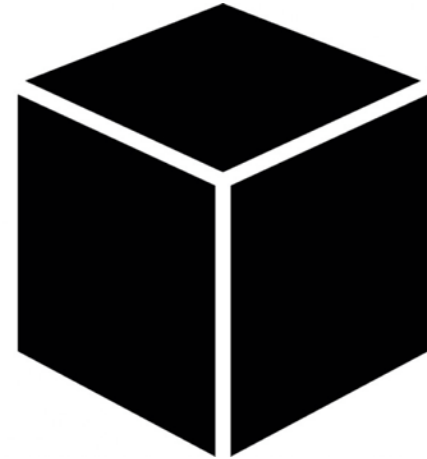
```
person = { "name": "David",  
           "location": "NYC",  
           "sport": "Rollerblading"}  
  
person["location"] = "Vancouver"
```

Dictionaries

```
>>> person = { "name": "David",  
...            "location": "NYC",  
...            "sport": "Rollerblading"}  
>>> print(person)  
{'sport': 'Rollerblading',  
 'name': 'David',  
 'location': 'NYC'}
```

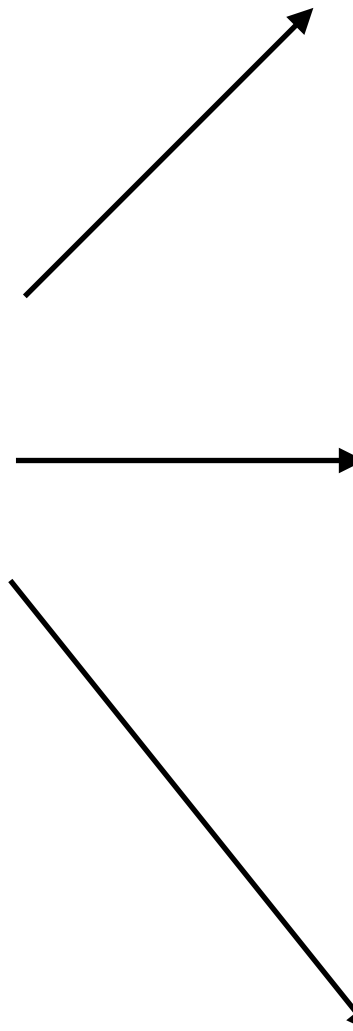

Text Parsing

“a long string of text,
often generated by a human”



Text Parsing

“apple, banana, cherry”



Text Parsing

```
string = "apple,banana,cherry,date"  
fruits = string.split(",")  
# fruits is now = ["apple" , "banana",  
#                  "cherry", "date"]
```

CSV Parsing

- Columnar data
- Just like Excel!
- Most common form of data

```
1,"Goroka","Goroka","Papua New Guinea","GKA","AYGA",-6.081689,145.391881,5282,10,"U","Pacific/Port_Moresby"
2,"Madang","Madang","Papua New Guinea","MAG","AYMD",-5.207083,145.7887,20,10,"U","Pacific/Port_Moresby"
3,"Mount Hagen","Mount Hagen","Papua New Guinea","HGU","AYMH",-5.826789,144.295861,5388,10,"U","Pacific/Port_Moresby"
4,"Nadzab","Nadzab","Papua New Guinea","LAE","AYNZ",-6.569828,146.726242,239,10,"U","Pacific/Port_Moresby"
5,"Port Moresby Jacksons Intl","Port Moresby","Papua New Guinea","POM","AYPY",-9.443383,147.22005,146,10,"U","Pacific/Port_Moresby"
6,"Wewak Intl","Wewak","Papua New Guinea","WWK","AYWK",-3.583828,143.669186,19,10,"U","Pacific/Port_Moresby"
7,"Narsarsuaq","Narsarsuaq","Greenland","UAK","BGBW",61.160517,-45.425978,112,-3,"E","America/Godthab"
8,"Nuuk","Godthaab","Greenland","GOH","BGGH",64.190922,-51.678064,283,-3,"E","America/Godthab"
9,"Sondre Stromfjord","Sondrestrom","Greenland","SFJ","BGSF",67.016969,-50.689325,165,-3,"E","America/Godthab"
10,"Thule Air Base","Thule","Greenland","THU","BGTL",76.531203,-68.703161,251,-4,"E","America/Thule"
11,"Akureyri","Akureyri","Iceland","AEY","BIAR",65.659994,-18.072703,6,0,"N","Atlantic/Reykjavik"
12,"Egilsstadir","Egilsstadir","Iceland","EGS","BIEG",65.283333,-14.401389,76,0,"N","Atlantic/Reykjavik"
13,"Hornafjordur","Hofn","Iceland","HFN","BIHN",64.295556,-15.227222,24,0,"N","Atlantic/Reykjavik"
14,"Husavik","Husavik","Iceland","HZK","BIHU",65.952328,-17.425978,48,0,"N","Atlantic/Reykjavik"
15,"Isafjordur","Isafjordur","Iceland","IFJ","BIIS",66.058056,-23.135278,8,0,"N","Atlantic/Reykjavik"
16,"Keflavik International Airport","Keflavik","Iceland","KEF","BIKF",63.985,-22.605556,171,0,"N","Atlantic/Reykjavik"
17,"Patreksfjordur","Patreksfjordur","Iceland","PFJ","BIPA",65.555833,-23.965,11,0,"N","Atlantic/Reykjavik"
18,"Reykjavik","Reykjavik","Iceland","RKV","BIRK",64.13,-21.940556,48,0,"N","Atlantic/Reykjavik"
19,"Siglufjordur","Siglufjordur","Iceland","SIJ","BISI",66.133333,-18.916667,10,0,"N","Atlantic/Reykjavik"
20,"Vestmannaeyjar","Vestmannaeyjar","Iceland","VEY","BIVM",63.424303,-20.278875,326,0,"N","Atlantic/Reykjavik"
21,"Sault Ste Marie","Sault Sainte Marie","Canada","YAM","CYAM",46.485001,-84.509445,630,-5,"A","America/Toronto"
22,"Winnipeg St Andrews","Winnipeg","Canada","YAV","CYAV",50.056389,-97.0325,760,-6,"A","America/Winnipeg"
23,"Shearwater","Halifax","Canada","YAW","CYAW",44.639721,-63.499444,167,-4,"A","America/Halifax"
24,"St Anthony","St. Anthony","Canada","YAY","CYAY",51.391944,-56.083056,108,-3.5,"A","America/St_Johns"
25,"Tofino","Tofino","Canada","YAZ","CYAZ",49.082222,-125.7725,80,-8,"A","America/Vancouver"
26,"Kugaaruk","Pelly Bay","Canada","YBB","CYBB",68.534444,-89.808056,56,-7,"A","America/Edmonton"
27,"Baie Comeau","Baie Comeau","Canada","YBC","CYBC",49.1325,-68.204444,71,-5,"A","America/Toronto"
28,"Bagotville","Bagotville","Canada","YBG","CYBG",48.330555,-70.996391,522,-5,"A","America/Toronto"
29,"Baker Lake","Baker Lake","Canada","YBK","CYBK",64.298889,-96.077778,59,-6,"A","America/Winnipeg"
30,"Campbell River","Campbell River","Canada","YBL","CYBL",49.950832,-125.270833,346,-8,"A","America/Vancouver"
31,"Brandon Muni","Brandon","Canada","YBR","CYBR",49.91,-99.951944,1343,-6,"A","America/Winnipeg"
32,"Cambridge Bay","Cambridge Bay","Canada","YCB","CYCB",69.108055,-105.138333,90,-7,"A","America/Edmonton"
33,"Nanaimo","Nanaimo","Canada","YCD","CYCD",49.052333,-123.870167,93,-8,"A","America/Vancouver"
34,"Castlegar","Castlegar","Canada","YCG","CYCG",49.296389,-117.6325,1624,-8,"A","America/Vancouver"
35,"Miramichi","Chatham","Canada","YCH","CYCH",47.007778,-65.449167,108,-4,"A","America/Halifax"
36,"Charlo","Charlo","Canada","YCL","CYCL",47.990833,-66.330278,132,-4,"A","America/Halifax"
37,"Kugluktuk","Coppermine","Canada","YCO","CYCO",67.816667,-115.143889,74,-7,"A","America/Edmonton"
38,"Coronation","Coronation","Canada","YCT","CYCT",52.075001,-111.445278,2595,-7,"A","America/Edmonton"
39,"Chilliwack","Chilliwack","Canada","YCW","CYCW",49.152779,-121.93889,32,-8,"A","America/Vancouver"
40,"Clyde River","Clyde River","Canada","YCY","CYCY",70.486111,-68.516667,87,-5,"A","America/Toronto"
41,"Fairmont Hot Springs","Coral Harbour","Canada","YZS","CYCZ",64.193333,-83.359444,2661,-5,"A","America/Coral_Harbour"
42,"Dawson City","Dawson","Canada","YDA","CYDA",64.043056,-139.127778,1215,-8,"A","America/Vancouver"
43,"Buxton","Buxton","Canada","YDB","CYDB",61.371111,-138.040556,2647,-8,"A","America/Vancouver"
```


airports.csv												
Liberation Sans 10												
A1												
	A	B	C	D	E	F	G	H	I	J	K	L
1	1	Goroka	Goroka	Papua New Guinea	GKA	AYGA	-6.081689	145.391881	5282	10	U	Pacific/Port_Moresby
2	2	Madang	Madang	Papua New Guinea	MAG	AYMD	-5.207083	145.7887	20	10	U	Pacific/Port_Moresby
3	3	Mount Hagen	Mount Hagen	Papua New Guinea	HGU	AYMH	-5.826789	144.295861	5388	10	U	Pacific/Port_Moresby
4	4	Nadzab	Nadzab	Papua New Guinea	LAE	AYNZ	-6.569828	146.726242	239	10	U	Pacific/Port_Moresby
5	5	Port Moresby Jackson	Port Moresby	Papua New Guinea	POM	AYPY	-9.443383	147.22005	146	10	U	Pacific/Port_Moresby
6	6	Wewak Intl	Wewak	Papua New Guinea	WWK	AYWK	-3.583828	143.669186	19	10	U	Pacific/Port_Moresby
7	7	Narsarsuaq	Narssarssuaq	Greenland	UAK	BGBW	61.160517	-45.425978	112	-3	E	America/Godthab
8	8	Nuuk	Godthaab	Greenland	GOH	BGGH	64.190922	-51.678064	283	-3	E	America/Godthab
9	9	Sondre Stromfjord	Sondrestrom	Greenland	SFJ	BGSF	67.016969	-50.689325	165	-3	E	America/Godthab
10	10	Thule Air Base	Thule	Greenland	THU	BGTL	76.531203	-68.703161	251	-4	E	America/Thule
11	11	Akureyri	Akureyri	Iceland	AEY	BIAR	65.659994	-18.072703	6	0	N	Atlantic/Reykjavik
12	12	Egilsstadir	Egilsstadir	Iceland	EGS	BIEG	65.283333	-14.401389	76	0	N	Atlantic/Reykjavik
13	13	Hornafjardur	Hofn	Iceland	HFN	BIHN	64.295556	-15.227222	24	0	N	Atlantic/Reykjavik
14	14	Husavik	Husavik	Iceland	HZK	BIHU	65.952328	-17.425978	48	0	N	Atlantic/Reykjavik
15	15	Isafjardur	Isafjardur	Iceland	IFJ	BIIS	66.058056	-23.135278	8	0	N	Atlantic/Reykjavik
16	16	Keflavik International	Keflavik	Iceland	KEF	BIKF	63.985	-22.605556	171	0	N	Atlantic/Reykjavik
17	17	Patreksfjardur	Patreksfjardur	Iceland	PFJ	BIPA	65.555833	-23.965	11	0	N	Atlantic/Reykjavik
18	18	Reykjavik	Reykjavik	Iceland	RKV	BIRK	64.13	-21.940556	48	0	N	Atlantic/Reykjavik
19	19	Siglufjardur	Siglufjardur	Iceland	SIJ	BISI	66.133333	-18.916667	10	0	N	Atlantic/Reykjavik
20	20	Vestmannaeyjar	Vestmannaeyjar	Iceland	VEY	BIVM	63.424303	-20.278875	326	0	N	Atlantic/Reykjavik
21	21	Sault Ste Marie	Sault Sainte Marie	Canada	YAM	CYAM	46.485001	-84.509445	630	-5	A	America/Toronto
22	22	Winnipeg St Andrew	Winnipeg	Canada	YAV	CYAV	50.056389	-97.0325	760	-6	A	America/Winnipeg
23	23	Shearwater	Halifax	Canada	YAW	CYAW	44.639721	-63.499444	167	-4	A	America/Halifax
24	24	St Anthony	St. Anthony	Canada	YAY	CYAY	51.391944	-56.083056	108	-3.5	A	America/St_Johns
25	25	Tofino	Tofino	Canada	YAZ	CYAZ	49.082222	-125.7725	80	-8	A	America/Vancouver
26	26	Kugaaruk	Pelly Bay	Canada	YBB	CYBB	68.534444	-89.808056	56	-7	A	America/Edmonton
27	27	Baie Comeau	Baie Comeau	Canada	YBC	CYBC	49.1325	-68.204444	71	-5	A	America/Toronto
28	28	Bagotville	Bagotville	Canada	YBG	CYBG	48.330555	-70.996391	522	-5	A	America/Toronto
29	29	Baker Lake	Baker Lake	Canada	YBK	CYBK	64.298889	-96.077778	59	-6	A	America/Winnipeg

airports

Sheet 1 / 1

Default

Sum=1

```
import csv

def load_rooms():
    """Load the rooms from CSV into a list of lists"""
    with open('rooms.csv') as csvfile:
        list_reader = csv.reader(csvfile)
        rooms = list(list_reader)
    return rooms
```

```
import csv
```

```
def load_rooms():
```

```
    """Load the rooms from CSV into a list of Dictionaries"""
```

```
    with open('rooms.csv') as csvfile:
```

```
        dict_reader = csv.DictReader(csvfile)
```

```
        rooms = list(dict_reader)
```

```
        return rooms
```


Higher-Order Functions

- Function that consumes or produces a function

Skaters Example

```
skaters = [  
    {"name": "Leon",  
     "origin": "Tel Aviv",  
     "style": "Wizard"},  
    {"name": "Naomi",  
     "origin": "London",  
     "style": "Slalom"},  
    {"name": "Bryan",  
     "origin": "Vancouver",  
     "style": "Skate Cross"},  
    {"name": "David",  
     "origin": "New Jersey",  
     "style": "Street"}]
```

```
def perform_on_row(f, rows):  
    for row in rows:  
        f(row)
```

```
def output(s):  
    print(s)
```

```
perform_on_row(output, skaters)
```

```
skaters = [  
  {"name": "Leon",  
    "origin": "Tel Aviv",  
    "style": "Wizard"},  
  {"name": "Naomi",  
    "origin": "London",  
    "style": "Slalom"},  
  {"name": "Bryan",  
    "origin": "Vancouver",  
    "style": "Skate Cross"},  
  {"name": "David",  
    "origin": "New Jersey",  
    "style": "Street"}]
```

```
def perform_on_row(f, rows):  
    for row in rows:  
        f(row)  
  
def output(s):  
    print(s)  
  
perform_on_row(output, skaters)
```

Math Example

```
def twice(f):  
    def new_func(x):  
        return f(f(x))  
    return new_func  
  
def square(x):  
    return x * x  
  
quartic = twice(square)  
print(quartic(2))
```

Recap

- Dictionaries
- Text Parsing
- CSV Parsing
- Higher-order Functions

Homework Assignment

- Write an adventure game
- Create at least 3 rooms
- Email it to me

Bonus Assignment

- How many airports begin with the letter 'Y?'
- How many airports are there within 100 km of 40.751753, -73.996126?
- Which airport is furthest away from all other airports?

Next Week

Pong!