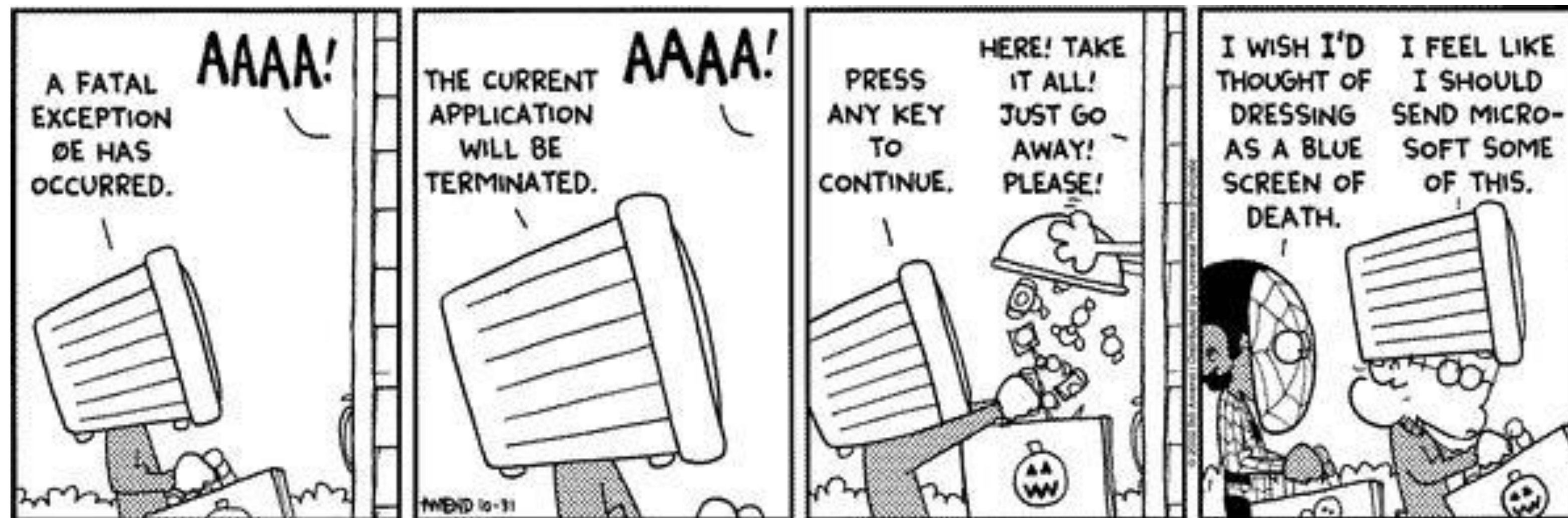
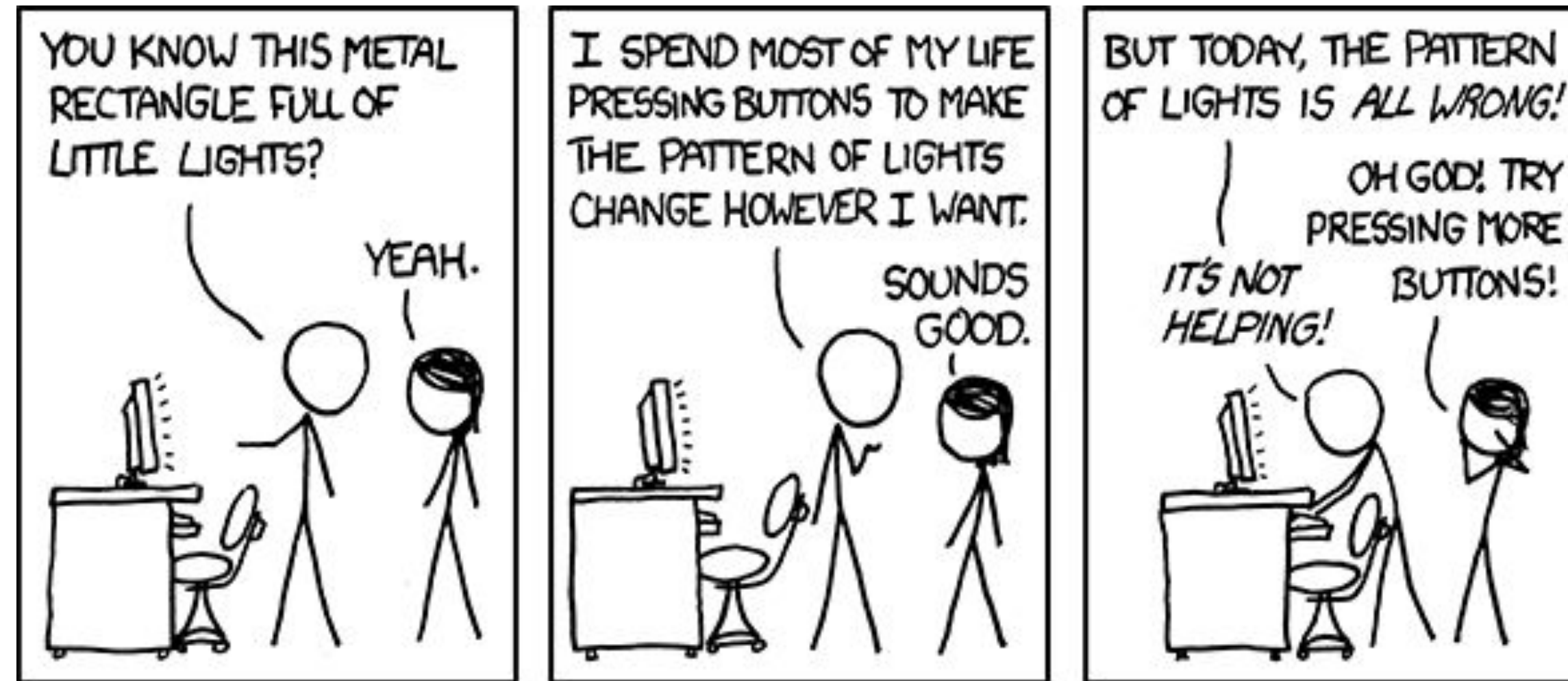


# Python Part 5

Spring 2022  
PCfB Class 8  
March 4, 2022



# Outline

- `pandas` module
- Types of errors
- Debugging tools/tips

**pandas module**

# Series

```
1 l = [1, "1", 2, 5.6]
```

```
2 s=pd.Series(l)
```

```
3 s
```

```
0      1
```

```
1      1
```

```
2      2
```

```
3    5.6
```

```
dtype: object
```

```
1 l = [1, "1", 2, 5.6]
2 s=pd.Series(l, index=["int1", "str1", "int2", "float1"])
3 s
```

```
int1      1
str1      1
int2      2
float1    5.6
dtype: object
```



```
1 d = {"int1":1, "str1":"1", "int2":2, "float1":5.6}
2 s=pd.Series(d)
3 s
```

```
int1      1
str1      1
int2      2
float1    5.6
dtype: object
```

```
1 l=list(range(10,50,10))
2 s=pd.Series(l)
3 s
```

```
0    10
1    20
2    30
3    40
```

```
dtype: int64
```



1	<code>s2 = s / 10</code>
2	<code>s2</code>

```
0    1.0
1    2.0
2    3.0
3    4.0
```

`dtype: float64`

1	<code>s3 = s + 325</code>
2	<code>s3</code>

```
0    335
1    345
2    355
3    365
```

`dtype: int64`

# Dataframe

# Convert file to dataframe

# Optional arguments

sep

header

names

index\_col

# Accessing data

Operation	Syntax	Result
Select column	<code>df[col]</code>	Series
Select row by label	<code>df.loc[label]</code>	Series
Select row by integer location	<code>df.iloc[loc]</code>	Series
Slice rows	<code>df[5:10]</code>	DataFrame
Select rows by boolean vector	<code>df[bool_vec]</code>	DataFrame



# Example dataset

City	Population	Elevation	Latitude	Longitude
Phoenix	1633000	1086	33.4484	-112.074
Flagstaff	74402	6909	35.1983	-111.6513
St. Louis	308174	466	38.627	-90.1994
Tulsa	402324	722	36.154	-95.9928

“cities.tsv”

```
1 import pandas as pd
```

```
1 df = pd.read_csv("cities.tsv", sep="\t", header=0, index_col=0)
```

```
1 df
```

	Population	Elevation	Latitude	Longitude
--	------------	-----------	----------	-----------

City	Population	Elevation	Latitude	Longitude
------	------------	-----------	----------	-----------

Phoenix	1633000	1086	33.4484	-112.0740
---------	---------	------	---------	-----------

Flagstaff	74402	6909	35.1983	-111.6513
-----------	-------	------	---------	-----------

St. Louis	308174	466	38.6270	-90.1994
-----------	--------	-----	---------	----------

Tulsa	402324	722	36.1540	-95.9928
-------	--------	-----	---------	----------

# Access a single column

```
1 df["Population"]
```

City

Phoenix            1633000

Flagstaff         74402

St. Louis          308174

Tulsa              402324

Name: Population, dtype: int64



# Access a single row - By name

```
1 df.loc["Flagstaff"]
```

```
Population      74402.0000
```

```
Elevation       6909.0000
```

```
Latitude        35.1983
```

```
Longitude       -111.6513
```

```
Name: Flagstaff, dtype: float64
```

# Access a single row - By position

```
1 df.iloc[1]
```

```
Population      74402.0000
```

```
Elevation       6909.0000
```

```
Latitude         35.1983
```

```
Longitude       -111.6513
```

```
Name: Flagstaff, dtype: float64
```



# Access specific item

```
1 df["Population"] ["Phoenix"]
```

```
1633000
```

```
1 df["Elevation"] ["Flagstaff"]
```

```
6909
```

# Access specific item

```
1 df.loc["Phoenix"]["Population"]
```

```
1633000.0
```

```
1 df.loc["Flagstaff"]["Elevation"]
```

```
6909.0
```

Pandas can be  
very inefficient!

# Pandas demo

# Types of errors



# Syntax Errors

- Detected before program is run
- Part of your code is not understood by the interpreter

```
File "/rev_comp_v1.py", line 10
    print (revseq.translate(trantab))
          ^
```

**SyntaxError: invalid syntax**

# Runtime Errors (aka, Exceptions)

- Occur when program is executed
- 29 standard exception types  
([https://www.tutorialspoint.com/python/standard\\_exceptions.htm](https://www.tutorialspoint.com/python/standard_exceptions.htm))
- Format = Traceback

Traceback (most recent call last):

```
File "./rev_comp_v3.py", line 19, in <module>  
    print_rev_comp(seq)
```

```
File "./rev_comp_v3.py", line 10, in print_rev_comp  
    print (revseq.translate(trantab))
```

AttributeError: 'builtin\_function\_or\_method' object  
has no attribute 'translate'

# Tip #1: Look up!

- Problem not necessarily on the line where the error was detected
- Could be on a preceding line



# Tool #1: `print()` function

- Prior to the error to check the status of important variables
- Within loops to check whether conditions have been met

# Tool #2: Comments

- Temporarily remove sections of code to isolate problem

**Use # to comment out a single line**

**Use ““ ”” to comment out multiple lines**

# Tip #2: Interactive interpreter

- Don't forget about the command line interface
- Easy way to test commands

# Executing script in working directory

```
./fasta2phy.py -f lassa_seqs.fasta
```

Please install:



**Adobe Illustrator**

or



**Inkscape**

And:



**Adobe Photoshop**

or



**GIMP**