Assignment-1

Notes from videos

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1 Positron

1.1 Getting Started with Positron: A Quick Tour

1.1.1 Folder from `Git`

`File-New Folder from Git`-enter the http (e.g.: https://github.com/posit-dev/posit-conf-2025-positron-assistant-demo.git)

Underlined packages are not installed

1.1.2 Install Packages

1. In the terminal, enter `uv venv` to create virtual environment
2. Enter `.venv\Scripts\activate`
3. e.g. `uv pip install -r requirements.txt` or `uv pip install jupyter`

1.1.3 For Help `help()`

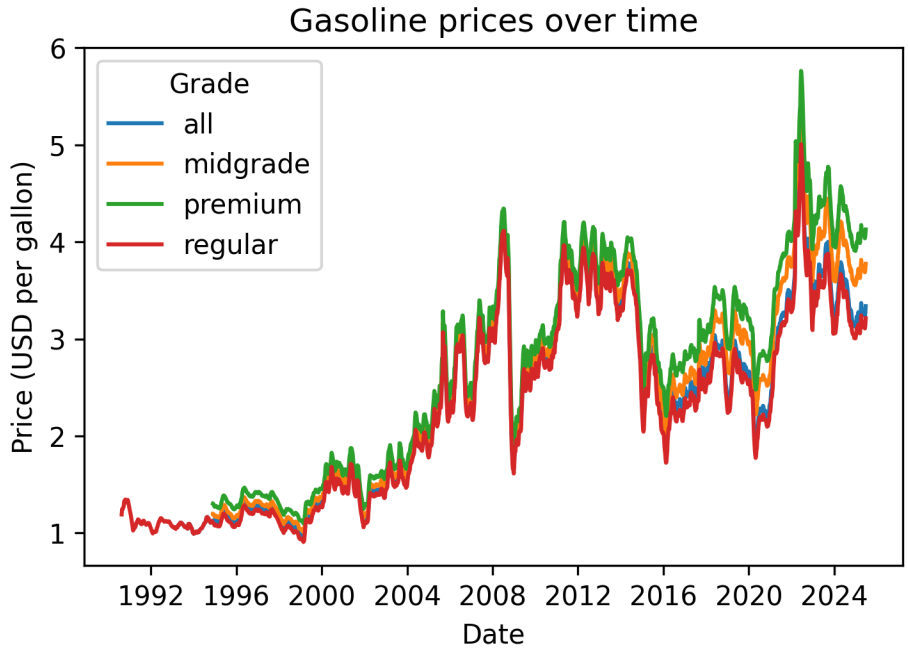
e.g.: In the console, enter `help(p9.theme_minimal)`

1.2 Your First Python Project in Positron

```
import pandas as pd
import matplotlib.pyplot as plt
```

```
data_url = 'https://raw.githubusercontent.com/rfordatascience/tidytuesday/main/data/2025/2025-07-01/weel

df = pd.read_csv(data_url, parse_dates=["date"])
```

```
filtered = df[

    (df["fuel"] == "gasoline") &

    (df["formulation"] == "all")

]

filtered = filtered.sort_values("date")


for grade, group in filtered.groupby("grade"):

    plt.plot(group["date"], group["price"], label=grade)


plt.title("Gasoline prices over time")

plt.xlabel("Date")

plt.ylabel("Price (USD per gallon)")

plt.legend(title="Grade")
```



1.2.1 Push to Github

(1) `Source Control`

- `Source Control` on the leftside
- Enter a message and then commit
- click the clould button to upload a branch

(2) `Posit Publisher`

- `Posit Publisher` on the leftside
- Can enter url to deploy on my own server

2 Python

2.1 Strings - Working with Textual Data

```
# print hello world

print('Hello World')


my_message1 = 'Crispy\'s World'

print(my_message1)


my_message = "Crispy's World"

print(my_message)
```

```
Hello World

Crispy's World

Crispy's World
```

```
print(len(my_message1))

print(len(my_message))
```

```
14
```

```
14
```

```
print(my_message[0])  # the 1st
print(my_message[6])  # the 7th, which is "'"
# print(my_message[15]) string index out of range
print(my_message[0:6])  # include [0] but not include [6]
print(my_message[:6])
print(my_message[6:])
```

```
C
'
Crispy
Crispy
's World
```

```
print(my_message.lower())
print(my_message.upper())
print(my_message.count("s"))
print(my_message.find("s"))  # it only returns the first 's', which is [3]
```

```
crispy's world
CRISPY'S WORLD
2
3
```

```
my_message.replace("World", "Universe")
print(my_message)
new_message = my_message.replace("World", "Universe")
print(new_message)
```

```
Crispy's World

Crispy's Universe
```

```
greeting = "Hello"

name = "Crispy"

message = greeting + name

print(message)

message = greeting + ", " + name

print(message)

message = greeting + ", " + name + ". Welcome!"

print(message)



message = "{}, {}. Welcome!".format(greeting, name)

print(message)
```

```
HelloCrispy

Hello, Crispy

Hello, Crispy. Welcome!

Hello, Crispy. Welcome!
```

```
message = f'{greeting}, {name}. Welcome!'

print(message)

message = f'{greeting}, {name.upper()}. Welcome!'

print(message)
```

```
Hello, Crispy. Welcome!

Hello, CRISPY. Welcome!
```

```
print(dir(name))  # Show functions that can be applied to it

# print(help(str))
```

```
print(help(str.lower))
```

```
['__add__', '__class__', '__contains__', '__delattr__', '__dir__', '__doc__', '__eq__', '__format__', '
Help on method descriptor lower:


lower(self, /) unbound builtins.str method
    Return a copy of the string converted to lowercase.


None
```

2.2 Integers and Floats - Working with Numeric Data

```
num=3

print(type(num))
```

```
<class 'int'>
```

```
num=3.14

print(type(num))
```

```
<class 'float'>
```

```
# Arithmetic Operators:

# Addition:       3 + 2

# Subtraction:    3 - 2

# Multiplication: 3 * 2

# Division:       3 / 2

# Floor Division: 3 // 2

# Exponent:       3 ** 2

# Modulus:        3 % 2
```

```
print(3 + 2)

print(3 - 2)

print(3 * 2)

print(3 / 2)

print(3 // 2)

print(3**2)

print(3 % 2)


print(2 % 2)

print(3 % 2)

print(4 % 2)

print(5 % 2)


print(3 * 2 + 1)
```

```
5

1

6

1.5

1

9

1

0

1

0

1

7
```

```
num = 1

num = num+1

print(num)


num = 1

num *= 10

print(num)
```

2

10

```
print(abs(-3))

print(round(3.75))

print(round(3.75, 1))
```

3

4

3.8

```
# Comparisons:

# Equal:            3 == 2

# Not Equal:        3 != 2

# Greater Than:     3 > 2

# Less Than:        3 < 2

# Greater or Equal: 3 >= 2

# Less or Equal:    3 <= 2


num_1 = 3

num_2 = 2
```

```
print(num_1 == num_2)

print(num_1 != num_2)

print(num_1 > num_2)

print(num_1 < num_2)

print(num_1 >= num_2)

print(num_1 <= num_2)
```

```
False

True

True

False

True

False
```

```
num_1 = "100"

num_2 = "200"  # as str

print(num_1 + num_2)



num_1 = int(num_1)

num_2 = int(num_2)

print(num_1 + num_2)
```

```
100200

300
```

2.3 Lists, Tuples, and Sets

- A list is ordered, mutable (can change), and allows duplicates.
- A tuple is ordered, immutable (cannot change), and allows duplicates. Faster than lists.
- A set is unordered, mutable, and contains no duplicates. Fast for membership test.

- A dictionary is Unordered (insertion-ordered since Python 3.7, but conceptually key-based), mutable, keys must be hashable, values can be anything

6. Quick containment matrix

Container ↓ contains →	list	tuple	set	dict
list	✅	✅	✅	✅
tuple	✅	✅	✅	✅
set	❌	✅*	❌	❌
dict (keys)	❌	✅*	❌	❌
dict (values)	✅	✅	✅	✅

* tuple must contain only hashable elements

Figure 1: containing relationship

2.3.1 Lists

```
courses = ["History", "Math", "Physics", "CompSci"]
print(courses)
print(courses[0])
print(courses[3])
print(courses[-1])  # convenient to get the last one
print(courses[0:2])  # include [0] but not include [2]
print(courses[2:])
```

```
['History', 'Math', 'Physics', 'CompSci']
History
CompSci
CompSci
['History', 'Math']
```

```
['Physics', 'CompSci']
```

```
courses = ["History", "Math", "Physics", "CompSci"]

courses.append("Art")

print(courses)


courses = ["History", "Math", "Physics", "CompSci"]

courses.insert(0, "Art")

print(courses)


courses = ["History", "Math", "Physics", "CompSci"]

courses_2 = ["Art", "Education"]

courses.insert(0, courses_2)

print(courses)


courses = ["History", "Math", "Physics", "CompSci"]

courses_2 = ["Art", "Education"]

courses.extend(courses_2)  # or courses_2.extend(courses)

print(courses)


courses = ["History", "Math", "Physics", "CompSci"]

courses.remove("Math")

print(courses)
```

```
['History', 'Math', 'Physics', 'CompSci', 'Art']

['Art', 'History', 'Math', 'Physics', 'CompSci']

[['Art', 'Education'], 'History', 'Math', 'Physics', 'CompSci']

['History', 'Math', 'Physics', 'CompSci', 'Art', 'Education']
```

```
['History', 'Physics', 'CompSci']
```

```
courses = ["History", "Math", "Physics", "CompSci"]

popped = courses.pop()

print(popped)

print(courses)
```

```
CompSci

['History', 'Math', 'Physics']
```

```
courses = ["History", "Math", "Physics", "CompSci"]

courses.reverse()

print(courses)


courses = ["History", "Math", "Physics", "CompSci"]

courses.sort()  # Alphabet

print(courses)


nums = [1, 4, 3, 5, 2]

nums.sort() # assending

print(nums)


courses = ["History", "Math", "Physics", "CompSci"]

courses.sort(reverse=True)

print(courses)


nums = [1, 4, 3, 5, 2]

nums.sort(reverse=True)

print(nums)
```

```
['CompSci', 'Physics', 'Math', 'History']

['CompSci', 'History', 'Math', 'Physics']

[1, 2, 3, 4, 5]

['Physics', 'Math', 'History', 'CompSci']

[5, 4, 3, 2, 1]
```

```
# These methods above will change the original item

# To avoid changing:


courses = ["History", "Math", "Physics", "CompSci"]

sorted_courses = sorted(courses)

print(courses)
```

```
['History', 'Math', 'Physics', 'CompSci']
```

```
nums = [1, 4, 3, 5, 2]

print(min(nums))

print(max(nums))

print(sum(nums))


courses = ["History", "Math", "Physics", "CompSci"]

print(courses.index("CompSci")) # courses[3]

print("Math" in courses) # True or False
```

```
1

5

15

3

True
```

```
for item in courses:  # we can name it by any names we want, not just 'item'
    print(item)



for index, course in enumerate(courses, start=1):
    print(index, course)
```

```
History
Math
Physics
CompSci
1 History
2 Math
3 Physics
4 CompSci
```

```
course_str = "-".join(courses)
print(course_str)
```

```
History-Math-Physics-CompSci
```

```
new_list = course_str.split("-")
print(new_list)
```

```
['History', 'Math', 'Physics', 'CompSci']
```

2.3.2 Tuples

```
# Mutable
list_1 = ["History", "Math", "Physics", "CompSci"]
list_2 = list_1
```

```
print(list_1)
print(list_2)


list_1[0] = "Art"


print(list_1)
print(list_2) # list_2 equals to list_1 so it would change as list_1 change
```

```
['History', 'Math', 'Physics', 'CompSci']
['History', 'Math', 'Physics', 'CompSci']
['Art', 'Math', 'Physics', 'CompSci']
['Art', 'Math', 'Physics', 'CompSci']
```

```
# Immutable
tuple_1 = ("History", "Math", "Physics", "CompSci")
tuple_2 = tuple_1


print(tuple_1)
print(tuple_2)


# tuple_1[0] = "Art"
# TypeError: 'tuple' object does not support item assignment
```

```
('History', 'Math', 'Physics', 'CompSci')
('History', 'Math', 'Physics', 'CompSci')
```

2.3.3 Sets

```
# Sets
cs_courses = {'History', 'Math', 'Physics', 'CompSci'}
print(cs_courses)


cs_courses = {'History', 'Math', 'Physics', 'CompSci', 'Math'}
print(cs_courses)


print('Math' in cs_courses)
```

```
{'Math', 'History', 'CompSci', 'Physics'}
{'Math', 'History', 'CompSci', 'Physics'}
True
```

```
cs_courses = {'History', 'Math', 'Physics', 'CompSci'}
art_courses = {'History', 'Math', 'Art', 'Design'}


print(cs_courses.intersection(art_courses))
print(cs_courses.difference(art_courses))
print(cs_courses.union(art_courses))
```

```
{'Math', 'History'}
{'CompSci', 'Physics'}
{'Design', 'Art', 'History', 'Physics', 'Math', 'CompSci'}
```

```
# Empty Lists
empty_list = []
empty_list = list()
```

```
# Empty Tuples

empty_tuple = ()

empty_tuple = tuple()


# Empty Sets

#empty_set = {} # This isn't right! It's a dict

empty_set = set()
```

2.4 Dictionaries - Working with Key-Value Pairs

```
student = {'name':'Crispy', 'age':25, 'courses':['Math','CompSci']}

print(student)

print(student['courses'])

# print(student['phone']) # KeyError: 'phone'

print(student.get('phone'))

print(student.get('phone','Not Found')) # 'Not Found' is a desired return for None


student['phone']='555-5555-5555'

print(student.get('phone','Not Found'))


student.update({'name':'Jane', 'age': 26, 'phone':'666-6666-6666'})

print(student)


student = {'name':'Crispy', 'age':25, 'courses':['Math','CompSci']}

del student['age']

print(student)


student = {'name':'Crispy', 'age':25, 'courses':['Math','CompSci']}
```

```
age = student.pop('age')

print(student)

print(age)
```

```
{'name': 'Crispy', 'age': 25, 'courses': ['Math', 'CompSci']}

['Math', 'CompSci']
```

```
None

Not Found

555-5555-5555

{'name': 'Jane', 'age': 26, 'courses': ['Math', 'CompSci'], 'phone': '666-6666-6666'}

{'name': 'Crispy', 'courses': ['Math', 'CompSci']}

{'name': 'Crispy', 'courses': ['Math', 'CompSci']}

25
```

```
student = {'name':'Crispy', 'age':25, 'courses':['Math','CompSci']}

print(len(student))

print(student.keys())

print(student.items())
```

```
3

dict_keys(['name', 'age', 'courses'])

dict_items([('name', 'Crispy'), ('age', 25), ('courses', ['Math', 'CompSci'])])
```

```
for key in student:

    print(key)
```

```
name

age

courses
```

```
for key,value in student.items():

    print(key,value)
```

```
name Crispy

age 25

courses ['Math', 'CompSci']
```

- distionaries can be used to reture regression outcomes

2.5 Conditionals and Booleans - If, Else, and Elif Statements

```
if True:

    print('Contitional was True')
```

```
Contitional was True
```

```
if False:

    print('Contitional was True')



# nothing will be return if False
```

```
language = "python"



if language == "python":

    print("Contitional was True")



#  `language == 'python'` equals to `True`
```

```
Contitional was True
```

```
# Comparisons:

# Equal:            ==
```

```
# Not Equal:         !=

# Greater Than:      >

# Less Than:         <

# Greater or Equal: >=

# Less or Equal:     <=

# Object Identity:  is
```

```
language = "python"

if language == "python":

    print("Language is Python")

else:

    print("No match")


language = "JAVA"

if language == "python":

    print("Language is Python")

elif language == "JAVA":

    print("Language is JAVA")

else:

    print("No match")


language = "R"

if language == "python":

    print("Language is Python")

elif language == "JAVA":

    print("Language is JAVA")

else:

    print("No match")
```

```
Language is Python

Language is JAVA

No match
```

```
# and

# or

# not


user = "Admin"

logged_in = True

if user == "Admin" and logged_in:

    print("Admin Page")

else:

    print("Bad Creds")


logged_in = False

if not logged_in:

    print("Please log in")

else:

    print("Welcome")
```

```
Admin Page

Please log in
```

```
# Difference between `==` and `is`

a = [1, 2, 3]

b = [1, 2, 3]

print(a == b)
```

```
print(a is b)



print(id(a))

print(id(b))

print(id(a) == id(b))
```

```
True

False

1969617668480

1971277121088

False
```

```
# False Values:

# False

# None

# Zero of any numeric type

# Any empty sequence. For example, '', (), [].

# Any empty mapping. For example, {}.


condition = False  # same as `None`, `0`, `''`, `{}`, ...

if condition:

    print("Evaluated to True")

else:

    print("Evaluated to False")


# False will lead to else
```

```
Evaluated to False
```

```
condition = "Test"  # not False means True

if condition:

    print("Evaluated to True")

else:

    print("Evaluated to False")
```

```
Evaluated to True
```

2.6 Loops and Iterations - For/While Loops

```
nums = [1, 2, 3, 4, 5]


for num in nums:

    print(num)
```

```
1

2

3

4

5
```

```
nums = [1, 2, 3, 4, 5]


for num in nums:

    if num == 3:

        print('Found!')

        break # break statement: to stop the loops

    print(num)
```

```
1
```

```
2
Found!
```

```python
nums = [1, 2, 3, 4, 5]


for num in nums:
    if num == 3:
        print('Found!')
        continue # continue statement: continue to the next iteration
    print(num)
```

```
1
2
Found!
4
5
```

```python
# Nested list
nums = [1, 2, 3, 4, 5]


for num in nums:
    for letter in "abc":
        print(num, letter)


# Give all the combinations
```

```
1 a
1 b
1 c
2 a
```

```
2 b
2 c
3 a
3 b
3 c
4 a
4 b
4 c
5 a
5 b
5 c
```

```
for i in range(10): # from 0 to 9 (10 not included)
    print(i)
```

```
0
1
2
3
4
5
6
7
8
9
```

```
for i in range(1,11): # include 1 but not 11
    print(i)
```

```
1
```

```
2
3
4
5
6
7
8
9
10
```

loop will stop only until a certen condition is met or we hit a break

```
x = 0


while x < 10:  # a certen condition is met
    print(x)
    x += 1
```

```
0
1
2
3
4
5
6
7
8
9
```

```
x = 0


while x < 10:
    if x == 5:
        break  # hit a break
    print(x)
    x += 1
```

```
0
1
2
3
4
```

```
x = 0


while True: # create an infinite loop
    if x == 5:
        break  # we must have a break statement otherwise it won't stop
    # In those cases, use `Ctrl+C` to stop
    print(x)
    x += 1
```

```
0
1
2
3
4
```