

RB_EE6770_Homework_1

August 25, 2024

EE 6770 Fall 2024: Homework 1

1. Write your answer in the cell provided under each question.
2. **Write comments** in the code to explain your thoughts.
3. **Show your execution result.**
4. **Do your own work.**

0.0.1 Submission:

- **Submit this notebook file and the pdf version** - remember to add your name in the filename.
- Deadline: 11:59 pm, 8/25 (Sunday)

First, check the version of your Python.

```
[ ]: ## Your code here.  
import sys  
print(sys.version)
```

3.11.9 | packaged by Anaconda, Inc. | (main, Apr 19 2024, 16:40:41) [MSC v.1916
64 bit (AMD64)]

0.0.2 Q1: Fibonacci Sequence (30 Points)

0.0.3 Q1.1 Write a Python function named **Fibonacci** to generate a Fibonacci sequence of length **N**.

Recall that the recursive algorithm is:

$$F(0) = 0$$

$$F(1) = 1$$

$$F(n) = F(n-1) + F(n-2), \text{ for } n \geq 2$$

To show your result, assume **N = 20**

```
[ ]: ## Your code here.  
def Fibonacci(N):  
    accum = 0  
    a = 1  
    b = 2  
    for i in range(0, N):  
        if i == 0:
```

```

        accum = 0
    elif i == 1:
        accum += 1
    elif i == 2:
        accum += 2
    else:
        accum = b + a
        a = b
        b = accum
    return accum
print(Fibonacci(20))

```

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0.0.4 Q1.2 Write a function named `isFibonacci` to test if an input integer `N` is a Fibonacci number or not.

You can search the web and find out the criteria, or, you can generate Fibonacci numbers until the generated number is greater than or equal to `N`.

To show your result, try those two numbers: `N = 5702887` and `N = 74319`

```

[ ]: ## Your code here.
def isFibonacci(N):
    if (N == 0):
        return True
    else:
        a1 = 5 * (N**2) + 4
        a2 = 5 * (N**2) - 4
        b1 = int(a1**.5)
        b2 = int(a2**.5)

        if (b1**2 == a1) or (b2**2 == a2):
            return True
        else:
            return False

print(isFibonacci(74319))
print(isFibonacci(5702887))

```

True
False
True

0.0.5 Q2: (10 Points): With the following list of integers, remove all occurrences of 0 from the list.

```
my_list = [4, 0, 20, 0, 5, 20, -100, 0, 20]
```

Hint: you can use `del()`, `remove()`, `pop()` for this purpose.

```
[ ]: ### Your code here.

my_list = [4, 0, 20, 0, 5, 20, -100, 0, 20]
for i in my_list:
    if (i == 0):
        my_list.pop(my_list.index(i))
print(my_list)
```

[4, 20, 5, 20, -100, 20]

0.0.6 Q3: Happy Twosday! (30 Points)

February 22, 2022, was a rare day that all five digits of the date, 22222, are twos. The string is both **palindrome** and **symmetric**. Recall that - A sequence is said to be **palindrome** if one half of the string is the reverse of the other half, e.g., “madam”. - A sequence is said to be **symmetrical** if both halves of the string are the same, e.g., “abcabc”. - If the length of a sequence is an odd number, the middle element in the sequence is not considered.

0.0.7 Q3.1 Write a Python program to confirm that February 22 (22222) is indeed palindrome and symmetrical.

```
[ ]: ## Your code here.
def Palindrom(N):
    pal = str(N)
    length = len(pal) - 1
    for i in range(0, length):
        a = pal[i]
        b = pal[length - i]
        if (a != b):
            return False
    return True

def Symetric(N):
    sym = str(N)
    offset = int(len(sym) / 2) + (len(sym) % 2)
    span = int((len(sym) / 2))

    for i in range(0, span):
        a = sym[i]
        b = sym[i + offset]
        if (a != b):
            return False
    return True

print(Palindrom(22222))
print(Symetric(22222))
```

True
True

0.0.8 Q3.2 There are more dates in February 2022 that are also both palindrome and symmetric (such as 22122).

Write a Python loop to find out all the other dates.

```
[ ]: ## Your code here.
def Palindrom(N):
    pal = str(N)
    length = len(pal) - 1
    for i in range(0, length):
        a = pal[i]
        b = pal[length - i]
        if (a != b):
            return False
    return True

def Symetric(N):
    sym = str(N)
    offset = int(len(sym) / 2) + (len(sym) % 2)
    span = int((len(sym) / 2))

    for i in range(0, span):
        a = sym[i]
        b = sym[i + offset]
        if (a != b):
            return False
    return True

for i in range(20122, 22922):
    if (Palindrom(i) and Symetric(i)):
        print(i, " is a palindrom and symetric")
```

```
22022 is a palindrom and symetric
22122 is a palindrom and symetric
22222 is a palindrom and symetric
22322 is a palindrom and symetric
22422 is a palindrom and symetric
22522 is a palindrom and symetric
22622 is a palindrom and symetric
22722 is a palindrom and symetric
22822 is a palindrom and symetric
```

0.0.9 Q4: Python Class Practice (25 Points)

A Python class called `ShoppingList` is created to perform some simple tasks: 1. Add items and prices to the list 2. Calculate pre-tax sub-total 3. Calculate after-tax total

Here is a partially completed ShoppingList(dict), where the input is a dictionary.

```
[ ]: class ShoppingList(dict):

    tax_rate = 0.06

    def __init__(self):
        self = {}

    def addToList(self, item, price):
        self.update({item: price})    # Add item with its price and number of
        ↪ items bought to the shopping list

    def Subtotal(self):    # Add your code for pre-tax total
        sum = 0
        for item, price in self.items():
            sum += price[0] * price[1]
        return sum

    def AfterTax_Total(self):    # Add your code for after-tax total
        sum = 0
        for item, price in self.items():
            sum += price[0] * price[1]
        sum += sum * self.tax_rate
        return sum

list = {'Chia Seeds': (2.5, 2), 'avocado': (1.25, 3), 'potato': (3, 3), 'beer':
        ↪(9.99, 1)}
YinList = ShoppingList()
for item, price in list.items():
    YinList.addToList(item, price)

print("Subtotal = $%.2f" % YinList.Subtotal())
print("After Tax = $%.2f" % YinList.AfterTax_Total())
```

Subtotal = \$27.74
After Tax = \$29.40

Here is Dr. Yiin's shopping list:

{'Chia Seeds': (2.5, 2), 'avocado': (1.25, 3), 'potato': (3, 3), 'beer':(9.99, 1)}, where (a,b)

Please complete the two missing methods, Subtotal and AfterTax_Total and answer the following two questions:

1. Calculate the subtotal and after-tax total of Dr. Yiin's shopping list (show two decimal numbers).

2. The tax rate in Alpharetta is 7.75%, instead of 6%. Please revise the code, however, without modifying the class variable "tax_rate".

```
[ ]: ## Your code here
```