Logbook for ADT

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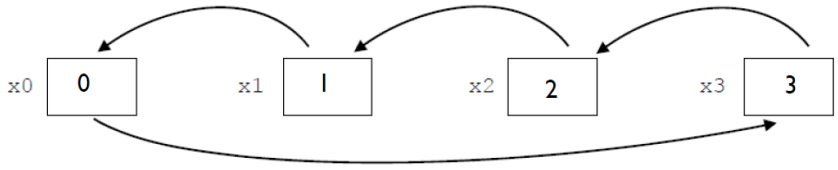
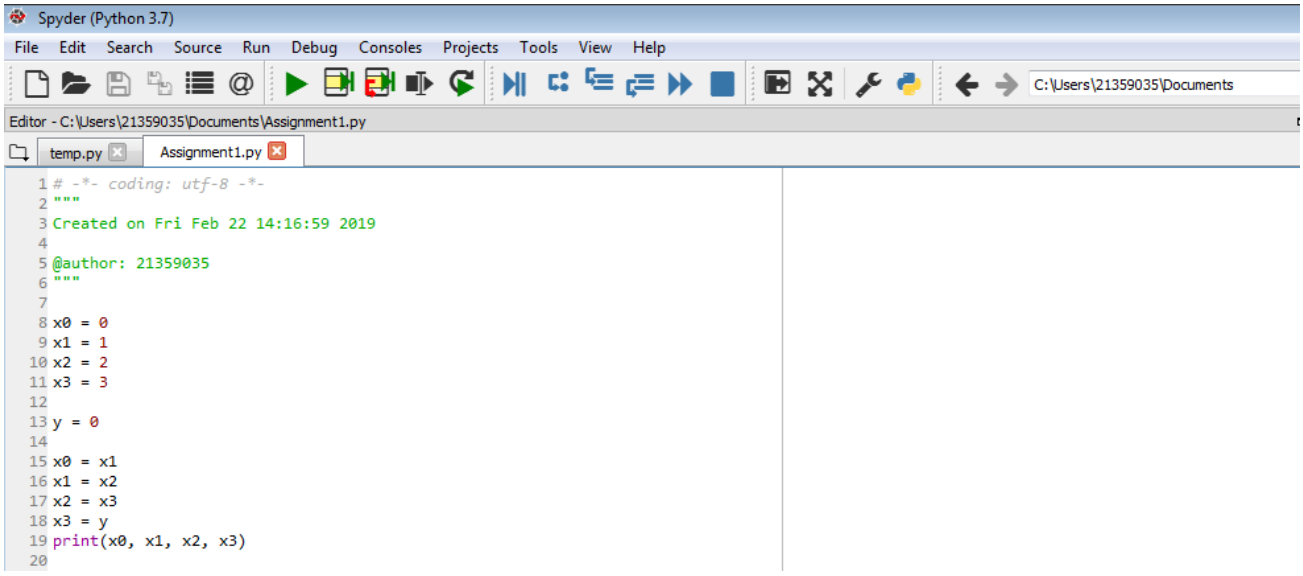
Week 2

1. Suppose that there are 4 variables names x0, x1, x2 and x3. Write the code to move the values stored in those variables to the left, with the leftmost value ending up in the rightmost variable, as shown in the diagram below.




```
print (x0, x1, x2, x3)
```

Your answer provided here.



2. Write a function that calculates the area of a circle

Area = $A = \pi r^2$

```
21 import math
22 radius = float(input("Enter a radius: "))
23 Area = math.pi * radius *radius
24 print(Area)
25
```

```
Console 1/A
  File "C:\ProgramData\Anaconda3\lib\site-packages\spyder_kernels\customize\spydercustomize.py", line 108, in execfile
    exec(compile(f.read(), filename, 'exec'), namespace)

  File "C:/Users/21359035/Documents/Assignment1.py", line 22, in <module>
    radius = float(input("Enter a radius: "))

ValueError: could not convert string to float:


In [5]:

In [5]: import math
   ...: radius = float(input("Enter a radius: "))
   ...: Area = math.pi * radius *radius
   ...: print(Area)
   ...:

Enter a radius:
Traceback (most recent call last):

  File "<ipython-input-5-402bf7a76843>", line 2, in <module>
    radius = float(input("Enter a radius: "))

ValueError: could not convert string to float:


In [6]:

In [6]: runfile('C:/Users/21359035/Documents/Assignment1.py', wdir='C:/Users/21359035/Documents')
1 2 3 0

Enter a radius: 10
314.1592653589793

In [7]:
```

3.

Better linear search

```
#print(Area)

def better_linear_search(A, x):
    for i in range(0, len(A)):
        if A[i] == x: return print (i)
    return print(-1)

better_linear_search([10, 5, 9, 9], 12)

def better_linear_search(A, x):
    for i in range(0, len(A)):
        if A[i] == x: return print(i)
    return print(-1)

better_linear_search([10, 5, 9, 9], 9)

#
#better_linear_search([10, 5, 9, 9], 12)

def better_linear_search(A, x):
    for i in range(0, len(A)):
        if A[i] == x: return print (i)
    return print(-1)

better_linear_search([10, 5, 9, 9], 50)
```

```
Console 1/A
In [7]: runfile('C:/Users/21359035/Documents/Assignment1.py', wdir='C:/Users/21359035/Documents')

In [8]: runfile('C:/Users/21359035/Documents/Assignment1.py', wdir='C:/Users/21359035/Documents')
0

In [9]: runfile('C:/Users/21359035/Documents/Assignment1.py', wdir='C:/Users/21359035/Documents')
1

In [10]: runfile('C:/Users/21359035/Documents/Assignment1.py', wdir='C:/Users/21359035/Documents')
2

In [11]: runfile('C:/Users/21359035/Documents/Assignment1.py', wdir='C:/Users/21359035/Documents')
-1

In [12]: runfile('C:/Users/21359035/Documents/Assignment1.py', wdir='C:/Users/21359035/Documents')
2

In [13]: runfile('C:/Users/21359035/Documents/Assignment1.py', wdir='C:/Users/21359035/Documents')
2

In [14]: runfile('C:/Users/21359035/Documents/Assignment1.py', wdir='C:/Users/21359035/Documents')
0

In [15]: runfile('C:/Users/21359035/Documents/Assignment1.py', wdir='C:/Users/21359035/Documents')
-1

In [16]:
```

```
39
40 def better_linear_search(A, x):
41     for i in range(0, len(A)):
42         if A[i] == x: return print (i)
43     return print (-1)
44
45 better_linear_search([10, 5, 9, 9], 8)
```

```
Console 1/A
In [20]: runfile('C:/Users/21359035/Documents/Assignment1.py', wdir='C:/Users/21359035/Documents')
Traceback (most recent call last):

  File "C:\ProgramData\Anaconda3\lib\site-packages\IPython\core\interactiveshell.py", line 3267, in run_code
    exec(code_obj, self.user_global_ns, self.user_ns)

  File "<ipython-input-20-d5707c83130e>", line 1, in <module>
    runfile('C:/Users/21359035/Documents/Assignment1.py', wdir='C:/Users/21359035/Documents')

  File "C:\ProgramData\Anaconda3\lib\site-packages\spyder_kernels\customize\spydercustomize.py", line 704, in runfile
    execfile(filename, namespace)

  File "C:\ProgramData\Anaconda3\lib\site-packages\spyder_kernels\customize\spydercustomize.py", line 108, in execfile
    exec(compile(f.read(), filename, 'exec'), namespace)

  File "C:/Users/21359035/Documents/Assignment1.py", line 42
    if A[i] == x: return print i
                          ^
SyntaxError: invalid syntax


In [21]:

In [21]: runfile('C:/Users/21359035/Documents/Assignment1.py', wdir='C:/Users/21359035/Documents')
-1

In [22]:
```

Week 3

1. Suppose an algorithm requires following number of operations for a problem of size n. Specify the dominant term(s) having the steepest increase in n. What is O() for each case?

- 7n-2
- n2 -3n+10
- 3n3 + 20 n2 + 5
- 1000n + n2 + 50000
- n/3
- n*logn
- n4 + n*log(n) + 300n3

- 0.01n + 0.01n2
- 2n + n0.5 + 0.5n1.25

Answer given here

$7n - 2 = O(n)$

$N^2-3n+10 = O(n^2)$

$3n^3+20n^2 +5 = O(n^3)$

$1000n+ n^2+ 50000 = (On^2)$

$n/3 = O(1)$ a constant

$n*logn = O(nlogn)$

$n^4+n*logn(n)+300n^3 = O(nlogn)$

$0.01n+0.01n^2 = O(n^2)$

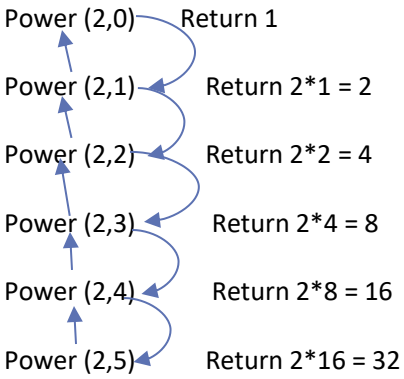
$2n + n^{0.5} + 0.5n^{1.25}$ $O(n^{0.5})$

2. What is the time complexity of the following two algorithms? Express your answer in terms of Big-O notation and justify the answer.

Your answer provided here.

Week 4 – Recursion

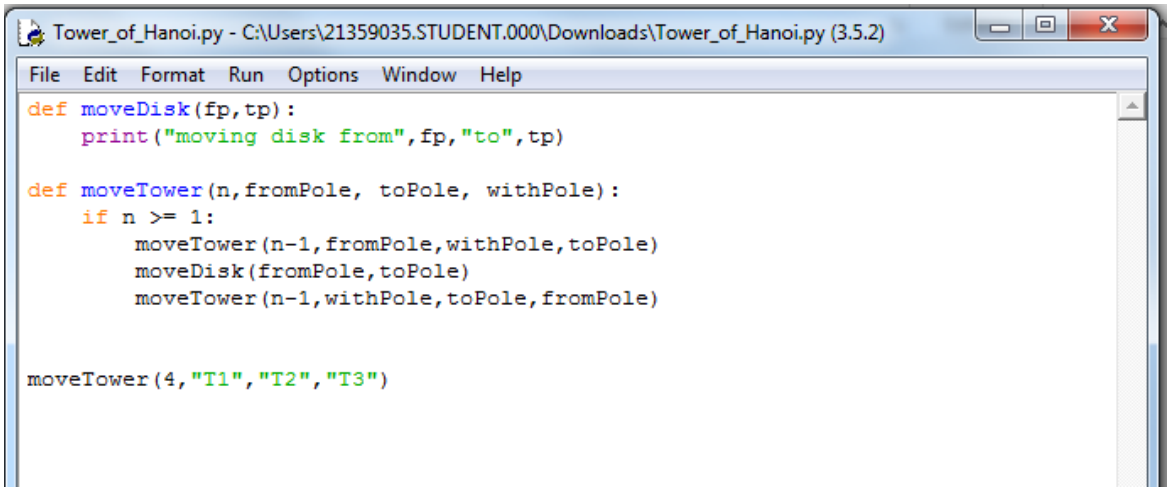
1.

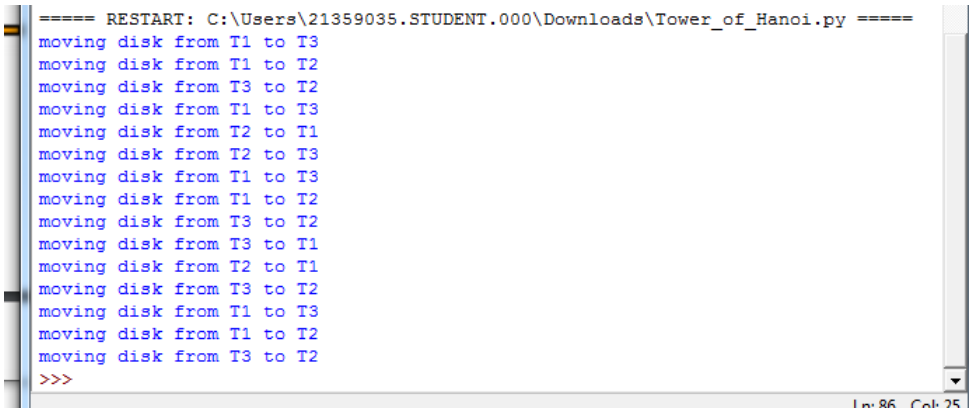


3.)

```
def moveDisk(fp,tp):
   print("moving disk from",fp,"to",tp)

def moveTower(n,fromPole, toPole, withPole):
   if n >= 1:
      moveTower(n-1,fromPole,withPole,toPole)
      moveDisk(fromPole,toPole)
          moveTower(n-1,withPole,toPole,fromPole)
```





Week 5 – Stacks

1.)

C. ‘z’ is the top item on the list when the sequence is complete.

4.) Evaluating postfix expressions

(2*3)+4 = 10

2*(3+4) = 14

(1*3)*(2+4)