PART-A

1. Check if a number belongs to the Fibonacci Sequence.

```
n = int(input("Enter a number: "))

a,b = 0,1

while b < n:

   a, b =b,a+b

print("Yes" if b == n else "No")
```

Output :

```
Enter a number: 4
No
```

2.Solve Quadratic Equations

```
import cmath

a = int(input("Enter A: "))

b = int(input("Enter B: "))

c = int(input("Enter C: "))


d=(b ** 2) -(4*a*c)


r1 =(-b-cmath.sqrt(d)) / (2*a)

r2 =(-b+cmath.sqrt(d)) / (2*a)


print("The Solution are {0} and {1} ".format(r1,r2))
```

Output :

```
Enter A : 4
Enter B : 5
Enter C : 8
The Solution are (-0.625-1.2686114456365274j) and (-0.625+1.2686114456365274j)
```

3. Find the sum of n natural numbers

```
n = int(input("Enter A Number :"))


if(n<0):
   print("Enter a Possitive Number ")
else:
   sum =0
   while(n>0):
      sum =sum+n   # OR sum +=n
      n=n-1            # OR num-=1
   print("The Sum is ",sum)
```

```
Enter A Number :4
The Sum is  10
```

4. Display Multiplication Tables

```
n = int(input("Enter the Number"))
for i in range(1,11):
   print(n,"X",i,"=",n*i)
```

Output ;

```
Enter the Number5
5 X 1 = 5
5 X 2 = 10
5 X 3 = 15
5 X 4 = 20
5 X 5 = 25
5 X 6 = 30
5 X 7 = 35
5 X 8 = 40
5 X 9 = 45
5 X 10 = 50
```

5. Check if a given number is a Prime Number or not

```
n = int(input("Enter Any Number :"))

if n>1:
   for i in range (2,n):
      if(n % i) == 0:
         print(n,"Is not a Prime Number")
         break
      else:
         print(n,"Is a prime Number")
         break
else:
   print(n,"Is not a Prime Number")
```

```
Enter Any Number :23
23 Is a prime Number
```

6. Implement a sequential search

```
arr = [3,5,2,1,8,7]
print(arr)
n = int(input("Enter a Number form the List : "))

for i in range(len(arr)):
    if arr[i] == n:
        print(f"The Target Number {n} was found at Index {i}")
        break
    else:
        print(f"The Target number {n} was not found in the list")
```

Output :

```
[3, 5, 2, 1, 8, 7]
Enter a Number form the List : 7
The Target number 7 was not found in the list
The Target number 7 was not found in the list
The Target number 7 was not found in the list
The Target number 7 was not found in the list
The Target number 7 was not found in the list
The Target Number 7 was found at Index 5
```

7. Explore string functions

```
s = "Hello World !"
print(len(s))
print(s.lower())
print(s.upper())
print(s.replace("Hello","Hi"))
name = "Arshad"
print(name.strip())
s2 = "Hello , World !"
print(s2.split(" , "))
```

Output :

```
13
hello world !
HELLO WORLD !
Hi World !
Arshad
['Hello', 'World !']
```

8.Implement of Stack

```
s = []
s.append("a")
s.append("b")
s.append("c")
print("Current Stack")
print(s)
print("POPing The elements form stack")
print(s.pop())
print(s.pop())
print(s.pop())

print("After the poping all 3 ")
print(s)
```

Output:

```
Current Stack
['a', 'b', 'c']
POPing The elements form stack
c
b
a
After the poping all 3
[]
```

PART B

1. **Read and write into a file**

```
file = open("arshad.txt","w")
file.write("Hi Friends, I am Your CR")
file = open("arshad.txt","r")
file_output = file.read()
file.close()

print(file_output)
```

Output:

```
--------------------------------
Hi Friends, I am Your CR
```

2. **Demonstrate usage of basic regular expression**

```
import re

ph = input("Enter the Phone Number")
pattern="\+\d\d\d\d\d\d\d\d\d\d\d\d"   # OR pattern="\+[0-9]{10,10}"
output = re.search(pattern,ph)

if output:
   print("Valid Phone Number ",ph)
else:
   print("Invalid Phone Number",ph)
```

Output :

```
Enter the Phone Number+917760554350
Valid Phone Number  +917760554350
```

3.Demonstrate use of advanced regular expressions for data validation

```
import re
reg_no = input("Enter University Register Number: ")
pattern = "^U[0-9]{2}[C][T]\d\d[S]\d\d\d\d" # OR pattern = "U\d\d[C][T]\d\d[S]\d\d\d\d"
result = re.search(pattern, reg_no)
if result:
 print("Valid University Register Number:", reg_no)
else:
 print("Invalid University Register Number:", reg_no)
```

Output :

```
Enter University Register Number: U01CT23S0049
Valid University Register Number: U01CT23S0049
```

4. Demonstrate use of List

```
def display_menu():
   print("\nMenu:")
   print("1. Append an item")
   print("2. Remove an item")
   print("3. Reverse the list")
   print("4. Exit")

def main():
   list = []

   while True:
      display_menu()
      c = input("Enter your c (1/2/3/4): ")

      if c == '1':
         item = input("Enter the item to append: ")
         list.append(item)
         print(f"Item '{item}' added. Current list: {list}")

      elif c == '2':
         item = input("Enter the item to remove: ")
         if item in list:
            list.remove(item)
            print(f"Item '{item}' removed. Current list: {list}")
         else:
            print(f"Item '{item}' not found in the list.")

      elif c == '3':
         list.reverse()
         print(f"List reversed. Current list: {list}")

      elif c == '4':
         print("Exiting the program.")
         break

      else:
         print("Invalid c. Please try again.")

if __name__ == "__main__":
   main()
```

Output :

```
Menu:
1. Append an item
2. Remove an item
3. Reverse the list
4. Exit
Enter your c (1/2/3/4): 1
Enter the item to append: 10
Item '10' added. Current list: ['10']

Menu:
1. Append an item
2. Remove an item
3. Reverse the list
4. Exit
Enter your c (1/2/3/4): 1
Enter the item to append: 20
Item '20' added. Current list: ['10', '20']

Menu:
1. Append an item
2. Remove an item
3. Reverse the list
4. Exit
Enter your c (1/2/3/4): 3
List reversed. Current list: ['20', '10']

Menu:
1. Append an item
2. Remove an item
3. Reverse the list
4. Exit
Enter your c (1/2/3/4):
```

5. Demonstrate use of Dictionaries

```
def menu():
   print("Choose an option:")
   print("1. Append")
   print("2. Remove")
   print("3. Reverse")
   print("4. Exit")

def append_item(d):
   key = input("Enter the key to append: ")
   value = input("Enter the value to append: ")
   d[key] = value
   print(f"Appended {key}: {value} to dictionary")

def remove_item(d):
   key = input("Enter the key to remove: ")
   if key in d:
      del d[key]
      print(f"Removed {key} from dictionary")
   else:
      print(f"Key '{key}' not found in dictionary")

def reverse_dict(d):
   # Reverse the dictionary (keys and values swap)
   reversed_dict = {v: k for k, v in d.items()}
   print("Reversed dictionary:")
   print(reversed_dict)

def main():
   my_dict = {}

   while True:
      menu()
      choice = input("Enter your choice (1-4): ")

      if choice == '1':
         append_item(my_dict)
      elif choice == '2':
         remove_item(my_dict)
      elif choice == '3':
         reverse_dict(my_dict)
      elif choice == '4':
         print("Exiting the program.")
         break
      else:
         print("Invalid choice, please try again.")

if __name__ == "__main__":    main()
```

Output :

```
Choose an option:
1. Append
2. Remove
3. Reverse
4. Exit
Enter your choice (1-4): 1
Enter the key to append: name
Enter the value to append: arshad
Appended name: arshad to dictionary
Choose an option:
1. Append
2. Remove
3. Reverse
4. Exit
Enter your choice (1-4): 1
Enter the key to append: id
Enter the value to append: 101
Appended id: 101 to dictionary
Choose an option:
1. Append
2. Remove
3. Reverse
4. Exit
Enter your choice (1-4): 3
Reversed dictionary:
{'arshad': 'name', '101': 'id'}
Choose an option:
1. Append
2. Remove
3. Reverse
4. Exit
Enter your choice (1-4):
```

6. Demonstrate Exceptions in Python

```
try:
   output = 5/0
   print("I am try Block")
except Exception:   # OR ZeroDivisionError
   print("Error : cannot divide by 0")
finally:
   print("I am Finally")
```

Output :

```
Error : cannot divide by 0
I am Finally
```

ALL BEST Friends