Batch:A3 **Roll No.:** **16010121051**
Experiment / assignment / tutorial No.
Grade: AA / AB / BB / BC / CC / CD /DD

Signature of the Staff In-charge with date

TITLE: Regular expression in Python

AIM: Program to demonstrate use of regular expressions in pattern matching.

Expected OUTCOME of Experiment: Use of basic data structure in Python.

Resource Needed: Python IDE

Theory:
A RegEx, or Regular Expression, is a sequence of characters that forms a search pattern. RegEx can be used to check if a string contains the specified search pattern.

RegEx Module
Python has a built-in package called re, which can be used to work with Regular Expressions. Import the re module: import re

RegEx in Python
When you have imported the re module, you can start using regular expressions:
Example
Search the string to see if it starts with "The" and ends with "Spain":

```
import re
txt = "The rain in Spain"
x = re.search("^The.*Spain$", txt)
```

RegEx Functions
The re module offers a set of functions that allows us to search a string for a match:

Function	Description
findall	Returns a list containing all matches
search	Returns a Match object if there is a match anywhere in the string
split	Returns a list where the string has been split at each match
sub	Replaces one or many matches with a string

Metacharacters

Metacharacters are characters with a special meaning:

Character	Description	Example
[]	A set of characters	"[a-m]"
\	Signals a special sequence (can also be used to escape special characters)	"\d"
.	Any character (except newline character)	"he..o"
^	Starts with	"^hello"
$	Ends with	"world$"
*	Zero or more occurrences	"aix*"
+	One or more occurrences	"aix+"
{}	Exactly the specified number of occurrences	"al{2}"
|	Either or	"falls|stays"
()	Capture and group	

Special Sequences

A special sequence is a \ followed by one of the characters in the list below, and has a special meaning:

Character	Description	Example
\A	Returns a match if the specified characters are at the beginning of the string	"\AThe"
\b	Returns a match where the specified characters are at the beginning or at the end of a word (the "r" in the beginning is making sure that the string is being treated as a "raw string")	r"\bain" r"ain\b"
\B	Returns a match where the specified characters are present, but NOT at the beginning (or at the end) of a word (the "r" in the beginning is making sure that the string is being treated as a "raw string")	r"\Bain" r"ain\B"
\d	Returns a match where the string contains digits (numbers from 0-9)	"\d"
\D	Returns a match where the string DOES NOT contain digits	"\D"
\s	Returns a match where the string contains a white space character	"\s"
\S	Returns a match where the string DOES NOT contain a white space character	"\S"
\w	Returns a match where the string contains any word characters (characters from a to Z, digits from 0-9, and the underscore _ character)	"\w"
\W	Returns a match where the string DOES NOT contain any word characters	"\W"

\Z	Returns a match if the specified characters are at the end of the string	"Spain\Z"

Sets

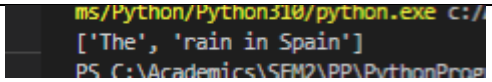
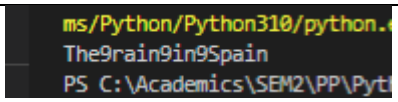
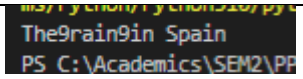
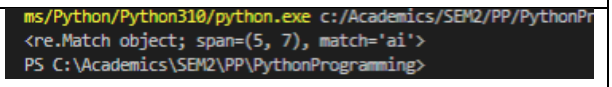
A set is a set of characters inside a pair of square brackets [] with a special meaning:

Set	Description
[arn]	Returns a match where one of the specified characters (a, r, or n) are present
[a-n]	Returns a match for any lower case character, alphabetically between a and n
[^arn]	Returns a match for any character EXCEPT a, r, and n
[0123]	Returns a match where any of the specified digits (0, 1, 2, or 3) are present
[0-9]	Returns a match for any digit between 0 and 9
[0-5][0-9]	Returns a match for any two-digit numbers from 00 and 59
[a-zA-Z]	Returns a match for any character alphabetically between a and z, lower case OR upper case
[+]	In sets, +, *, ., |, (), $,{} has no special meaning, so [+] means: return a match for any + character in the string

Problem Definition:

1. For given program find output

Sr. No.	Program	Output
	import re txt = "The rain in Spain" x = re.findall("ai", txt) print(x)	ms/Python/Python310/pyt ['ai', 'ai'] PS C:\Academics\SEM2\PP
2	import re txt = "The rain in Spain" x = re.findall("Portugal", txt) print(x)	[]
3	import re txt = "The rain in Spain" x = re.search("\s", txt) print("The first white-space character is located in position:", x.start())	ms/Python/Python310/python.exe c:/Academics/SEM2/PP/PythonProgramming The first white-space character is located in position: 3 PS C:\Academics\SEM2\PP\PythonProgramming>
4	import re txt = "The rain in Spain" x = re.search("Portugal", txt) print(x)	None PS C:\Academics\SEM
5	import re txt = "The rain in Spain" x = re.split("\s", txt) print(x)	ms/Python/Python310/python.exe c:/Acade ['The', 'rain', 'in', 'Spain']

6	import re txt = "The rain in Spain" x = re.split("\s", txt, 1) print(x)	
7	import re txt = "The rain in Spain" x = re.sub("\s", "9", txt) print(x)	
8	import re txt = "The rain in Spain" x = re.sub("\s", "9", txt, 2) print(x)	
9	import re txt = "The rain in Spain" x = re.search("ai", txt) print(x) #this will print an object	
10	import re txt = "The rain in Spain" x = re.search(r"\bS\w+", txt) print(x.span())	

2. WAP to verify whether his credit card numbers are valid or not. A valid credit card from ABC Bank has the following characteristics:

- It must start with a 4,5 or 6 .
- It must contain exactly 16 digits.
- It must only consist of digits (0-9).
- It may have digits in groups of 4, separated by one hyphen '-'

3. From given string extract phone numbers only and save it into list.

Txt = "Dave Martin
615-555-7164
173 Main St., Springfield RI 55924
davemartin@bogusemail.com

Charles Harris
800-555-5669
969 High St., Atlantis VA 34075
charlesharris@bogusemail.com

Eric Williams
560-555-5153
806 1st St., Faketown AK 86847
laurawilliams@bogusemail.com

Corey Jefferson
900-555-9340
826 Elm St., Epicburg NE 10671

coreyjefferson@bogusemail.com"

Books/ Journals/ Websites referred:

1. Reema Thareja, *Python Programming: Using Problem Solving Approach*, Oxford University Press, First Edition 2017, India
2. Sheetal Taneja and Naveen Kumar, *Python Programming: A modular Approach*, Pearson India, Second Edition 2018,India

Implementation details:

2)

```
import re
#collecting input from user i.e the card number to check
txt=input("Enter credit card number: ")
# pattern for checking
valid_pattern="^[456][0-9]{3}-[0-9]{4}-[0-9]{4}-[0-9]{4}$"
test=re.findall(valid_pattern,txt)
# final check
if len(test):
   print("Valid")
else:
   print("Not Valid")
```

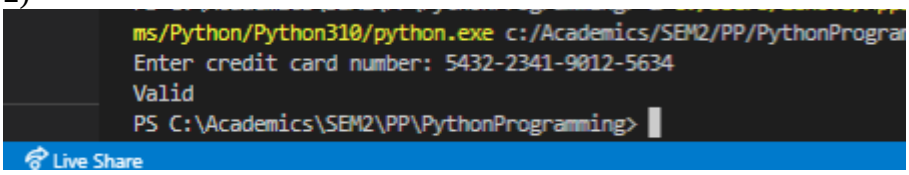
3)

```
import re
Txt ="""Dave Martin
615-555-7164
173 Main St., Springfield RI 55924
davemartin@bogusemail.com

Charles Harris
800-555-5669
969 High St., Atlantis VA 34075
charlesharris@bogusemail.com

Eric Williams
560-555-5153
806 1st St., Faketown AK 86847
laurawilliams@bogusemail.com
Corey Jefferson
900-555-9340
826 Elm St., Epicburg NE 10671
```

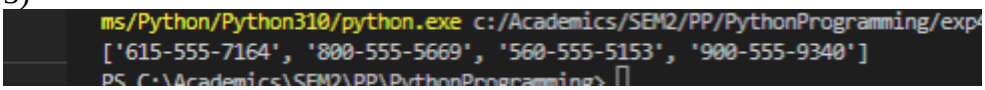
```
coreyjefferson@bogusemail.com"""

#  checking the pattern
pattern='\d{3}[-]\d{3}[-]\d{4}'
numbers=re.findall(pattern,Txt)
print(numbers)
```

Output(s):

2)



3)



Conclusion:
Used and learned basic data structure in Python.

Post Lab Descriptive Questions

What is difference in match and search function? explain with suitable example.

A.There is a difference between the use of both functions. Both return the first match of a substring found in the string, but re.match() searches only from the beginning of the string and return match object if found. But if a match of substring is found somewhere in the middle of the string, it returns none.

While re.search() searches for the whole string even if the string contains multi-lines and tries to find a match of the substring in all the lines of string

Eg.

```
import re
Substring ='string'
S1 ='''hello'''
S2 ='''hiii'''
print(re.search(Substring, S1, re.IGNORECASE))
print(re.match(Substring, S1, re.IGNORECASE))
print(re.search(Substring, S2, re.IGNORECASE))
print(re.match(Substring, S2, re.IGNORECASE))
```

Date: _____ **Signature of faculty in-charge**