

NPTEL
NPTEL ONLINE CERTIFICATION COURSE

Discrete Mathematics
Graph Theory - 1

Introduction to Python - Basics

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So I'm going to open anaconda now, how will I do that? I'll go to my Launchpad
(Refer Slide Time: 00:09)



if you're using a Mac machine this is how you have to do, but if you're using Windows probably it will be same on your desktop,

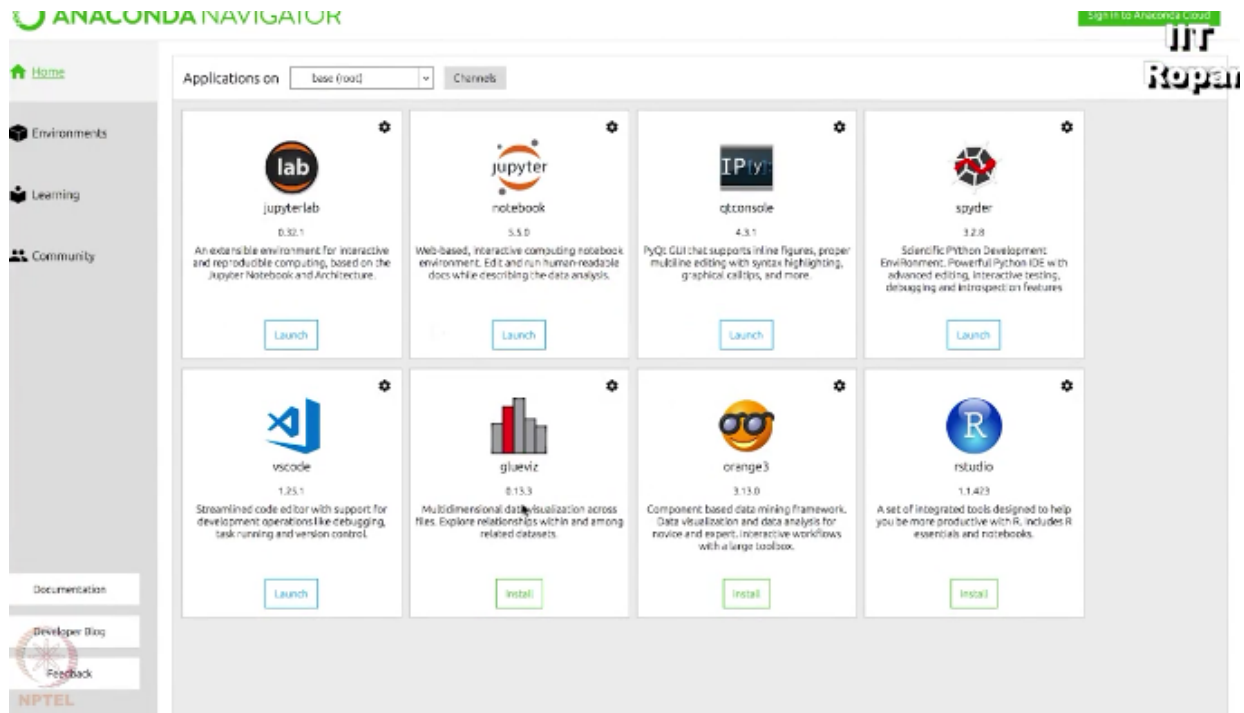
You can see anaconda navigated here
(Refer Slide Time: 00:19)



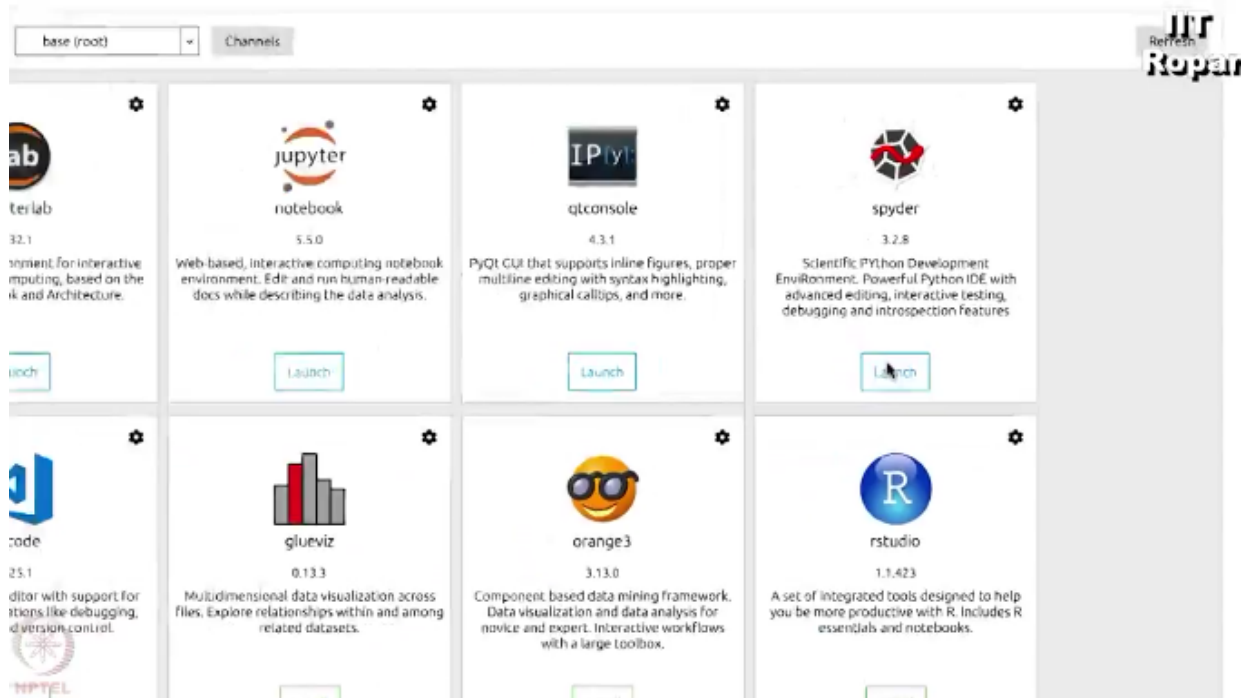
I'm going to click on that, it will take some 2 minutes time, please patiently wait here, now it says loading applications
(Refer Slide Time: 00:30)



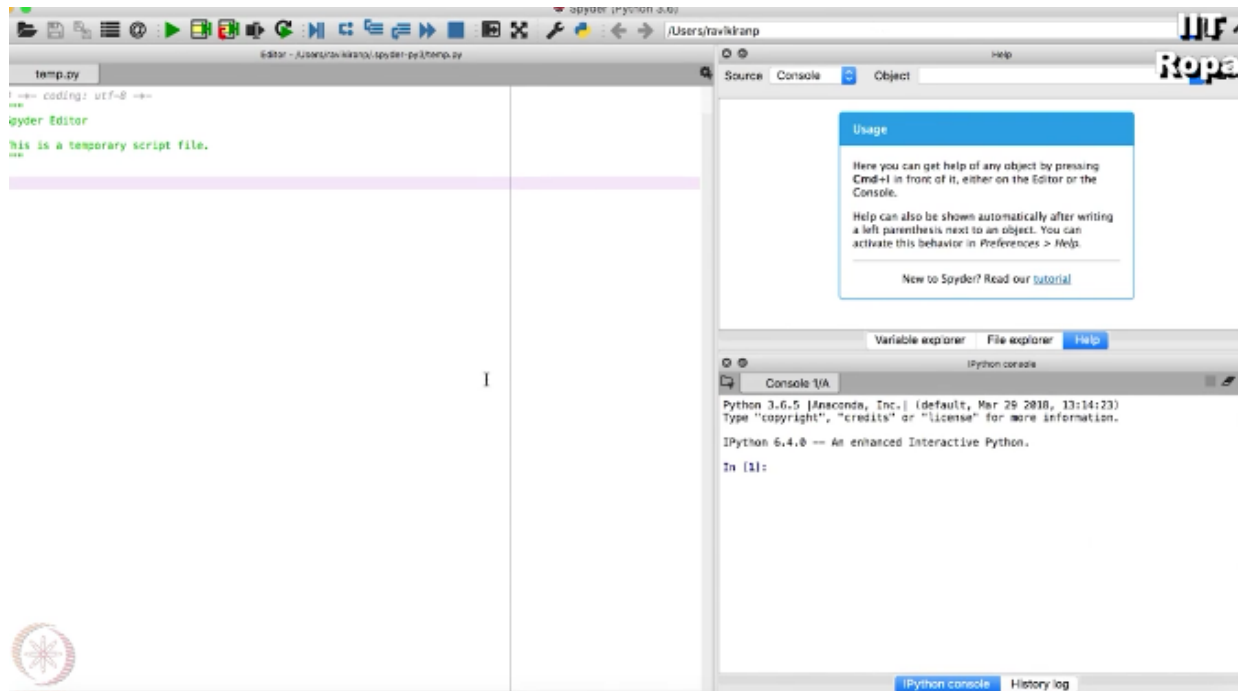
it will get opened, and you can see something like this
(Refer Slide Time: 00:34)



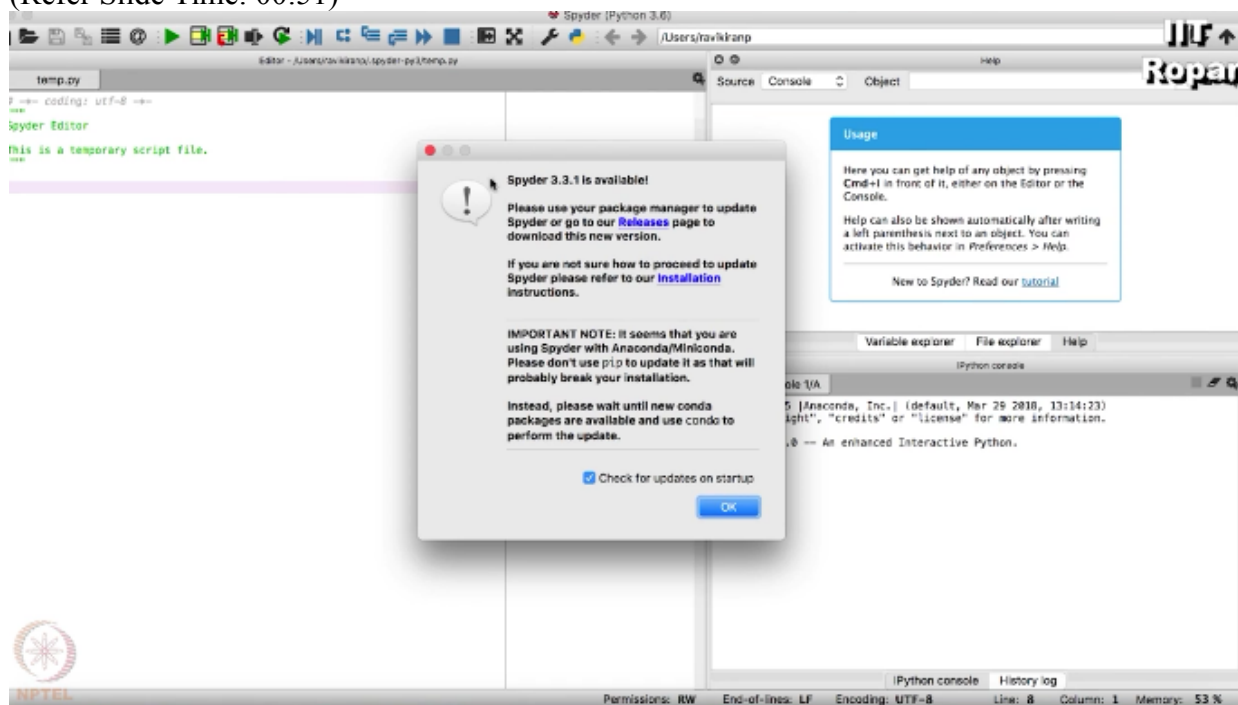
this window, now you have several options here, click on spider launch (Refer Slide Time: 00:39)



now this is the place where we'll be typing all our codes, (Refer Slide Time: 00:47)

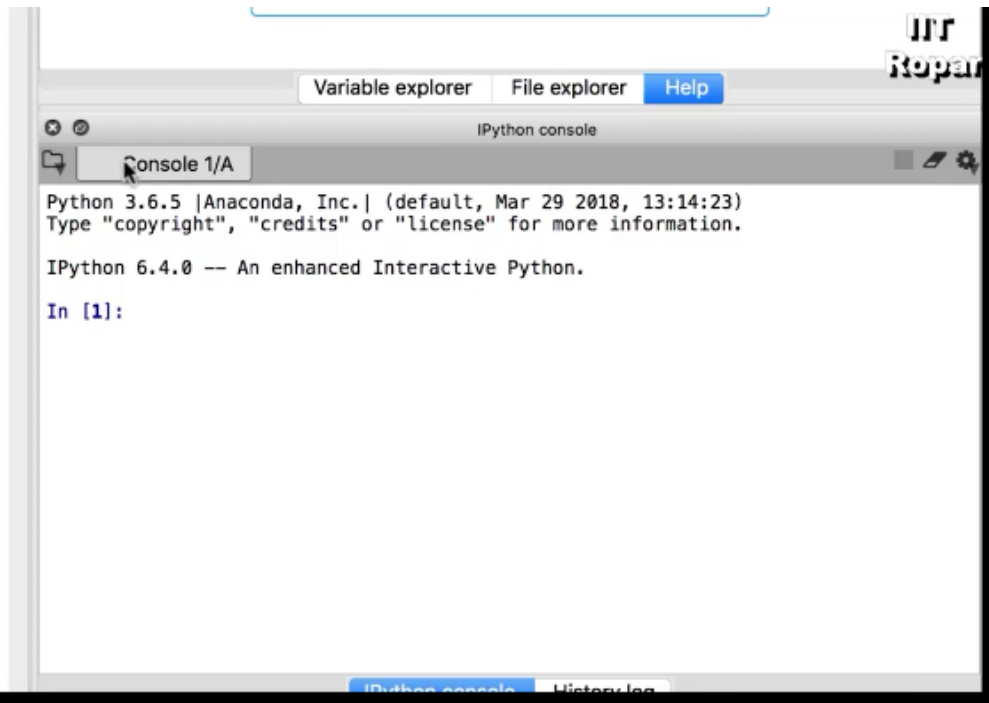


yes, now it has got opened and you'll be able to see something like this, (Refer Slide Time: 00:51)

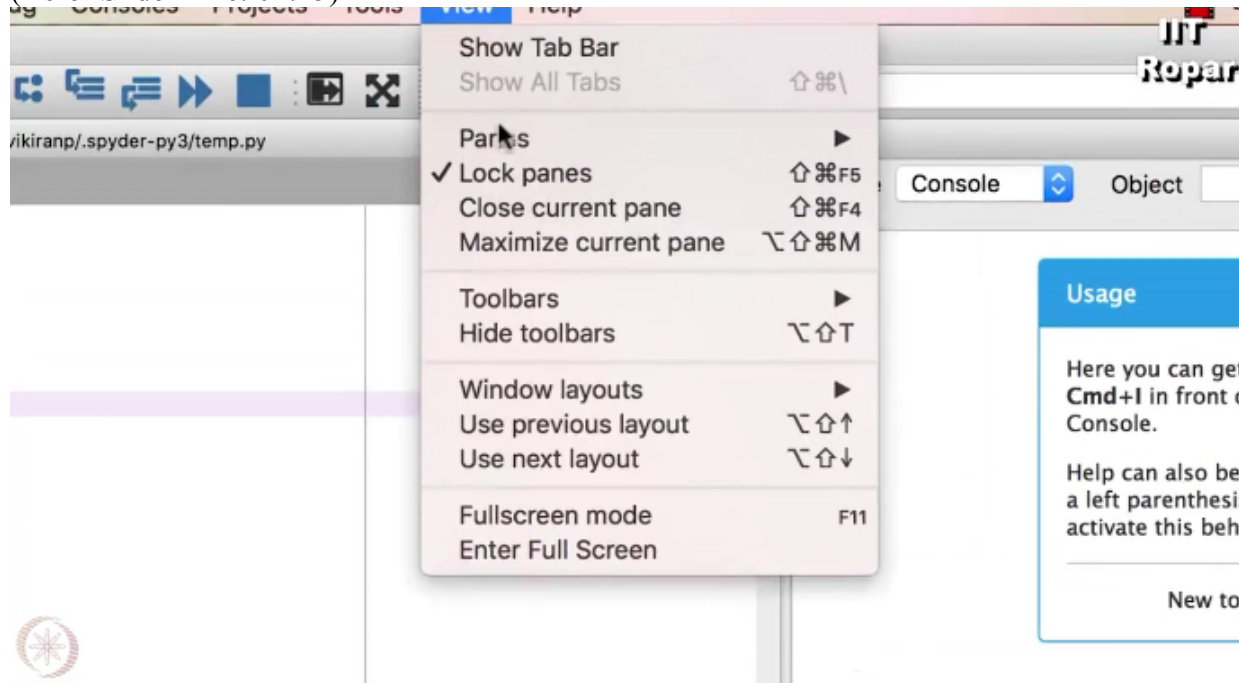


so it says that there is some update available I will do it later, okay.

Now this is a Python version 3.6, now this is the place where you are seeing console (Refer Slide Time: 01:04)



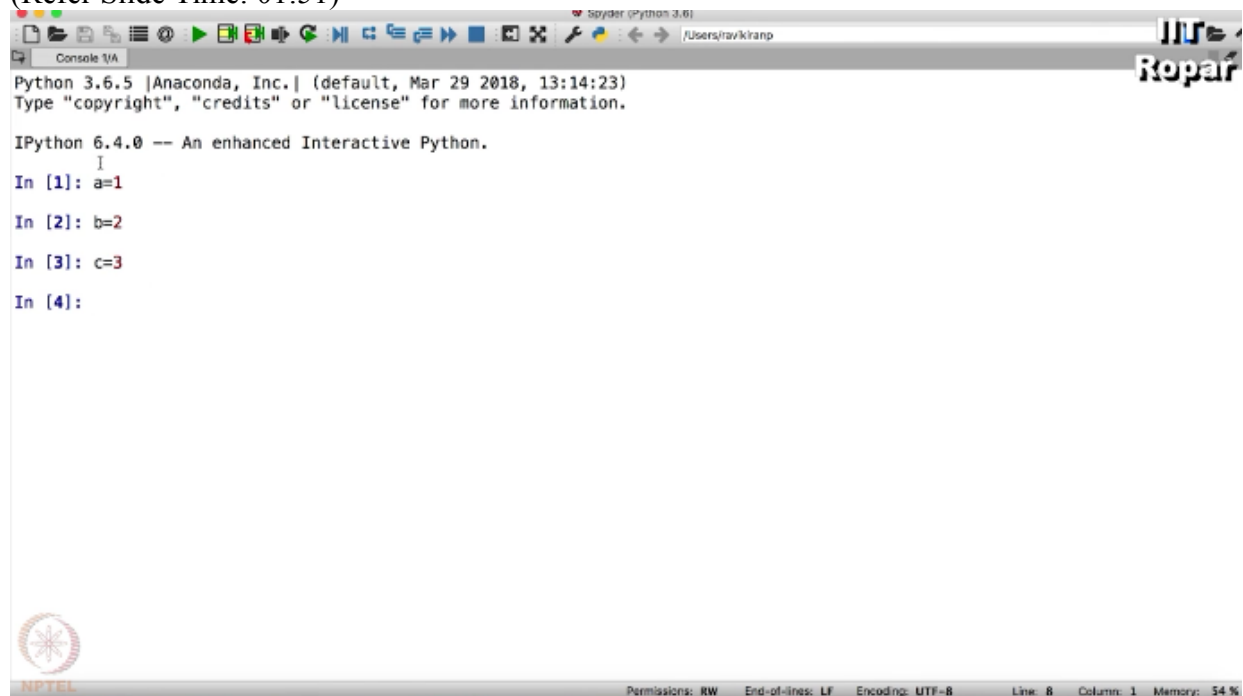
this is the place where I'm going to write all my codes now, I'll be working only at this space so what I'm going to do is I'll maximize this view, I'll go to the view on this toolbar here (Refer Slide Time: 01:15)



and I will click on maximize current pin now, if the font size is slightly small what you can do is control shift + and your size gets bigger.

Now so we are going to write everything here and you can even see your output here itself, so let me start I'll just take a variable A, what I mean by variable is I am just assigning some value to A here, $A = 1$, and I'm going to give B as some value say 2, and C as some value say 3, right

(Refer Slide Time: 01:51)

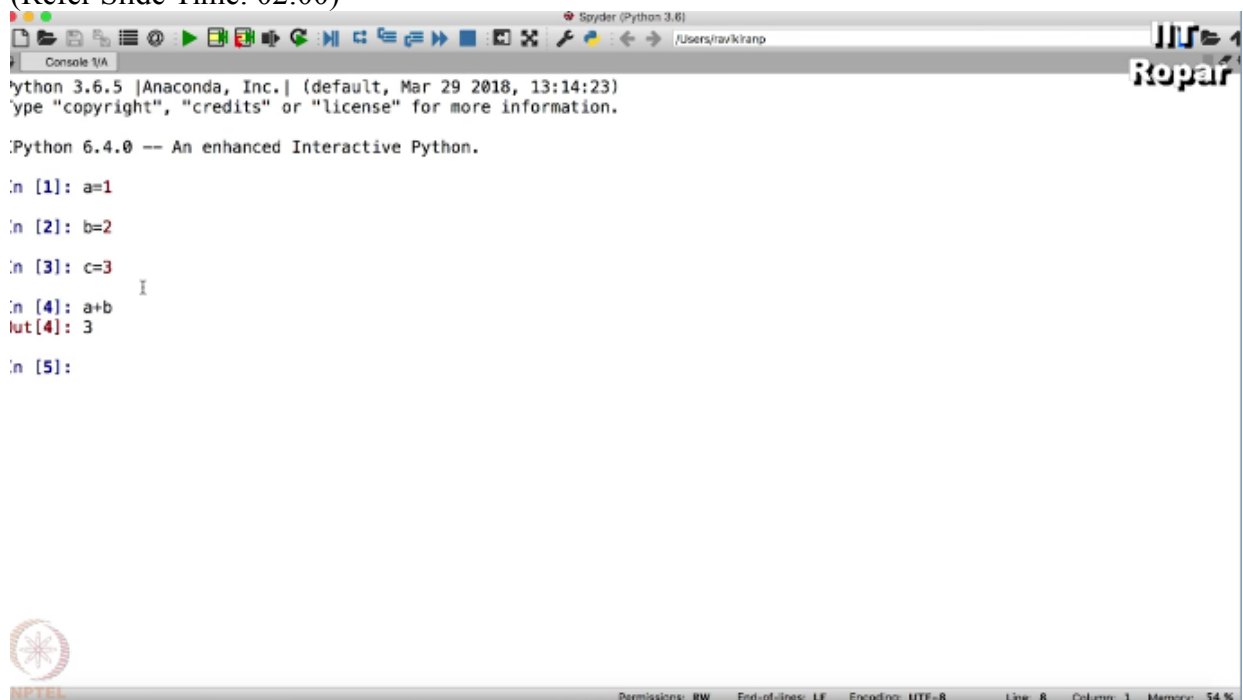


```
Python 3.6.5 [Anaconda, Inc.] (default, Mar 29 2018, 13:14:23)
Type "copyright", "credits" or "license" for more information.

IPython 6.4.0 -- An enhanced Interactive Python.
>>>
In [1]: a=1
In [2]: b=2
In [3]: c=3
In [4]:
```

now I am going to perform some operations on A, B, C, just observe A+B I want it C, you have got output as 3,

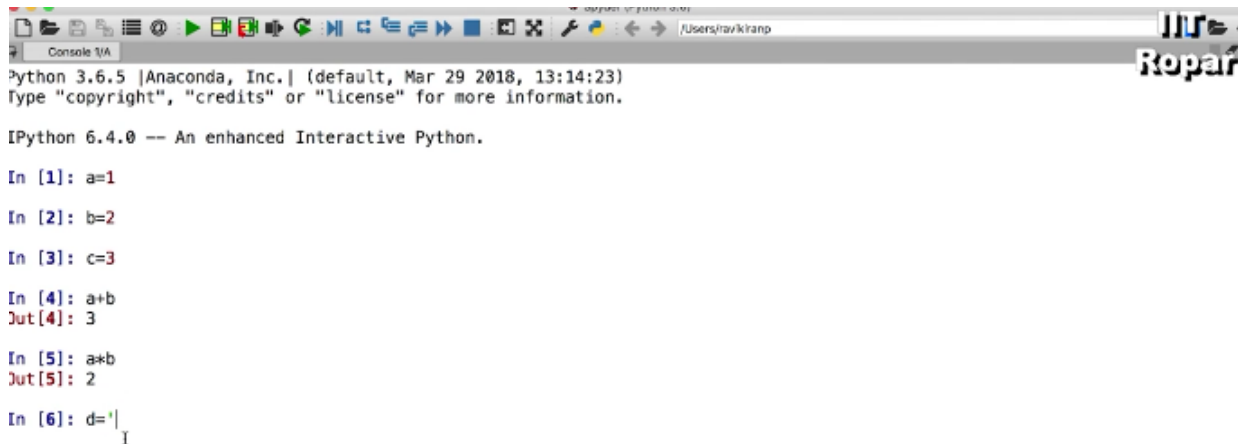
(Refer Slide Time: 02:00)



```
Python 3.6.5 [Anaconda, Inc.] (default, Mar 29 2018, 13:14:23)
Type "copyright", "credits" or "license" for more information.

Python 6.4.0 -- An enhanced Interactive Python.
>>>
In [1]: a=1
In [2]: b=2
In [3]: c=3
In [4]: a+b
Out[4]: 3
In [5]:
```

now I want to do A star B, so what will it give me? Yeah, A star B is 2, now what do I do? I'll take a new variable say D and I put it in, I'm going to insert a code here you see this code here
(Refer Slide Time: 02:19)



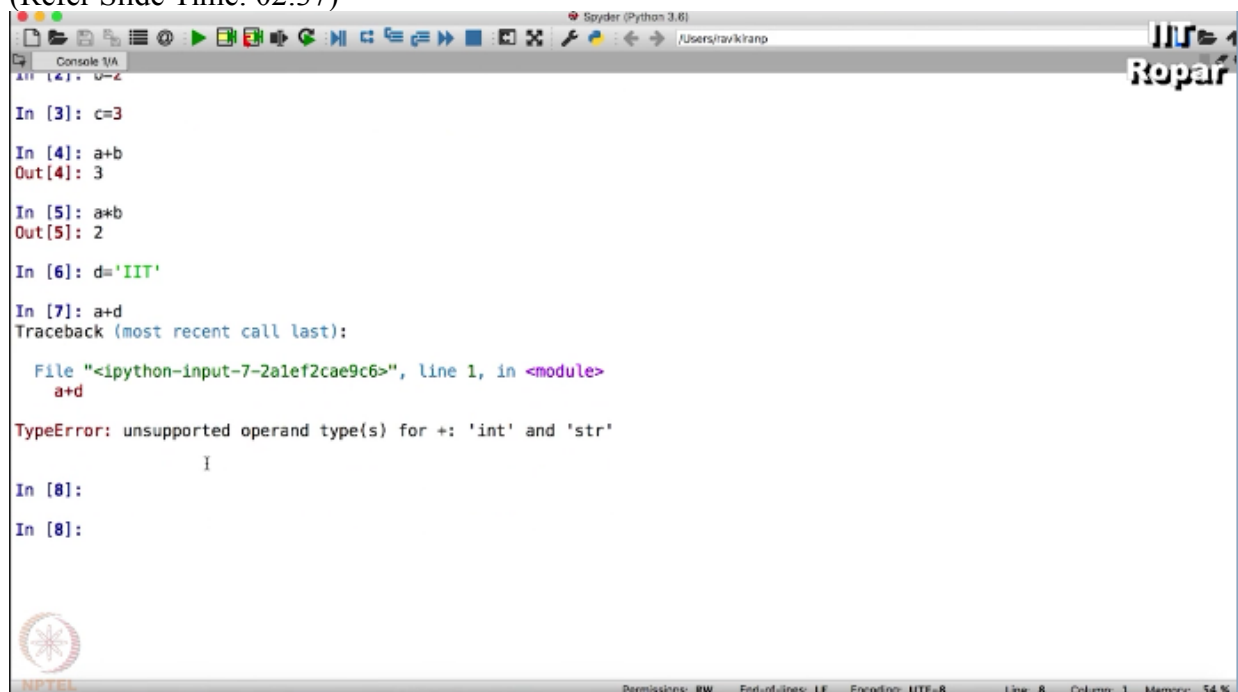
```
Python 3.6.5 |Anaconda, Inc.| (default, Mar 29 2018, 13:14:23)
Type "copyright", "credits" or "license" for more information.

IPython 6.4.0 -- An enhanced Interactive Python.

In [1]: a=1
In [2]: b=2
In [3]: c=3
In [4]: a+b
Out[4]: 3
In [5]: a*b
Out[5]: 2
In [6]: d=1
```



I'm going to type something like IIT, yes so D becomes IIT now, now what I will do is I will do a, this small letter a +d, let us see the output it says that there is some error (Refer Slide Time: 02:37)

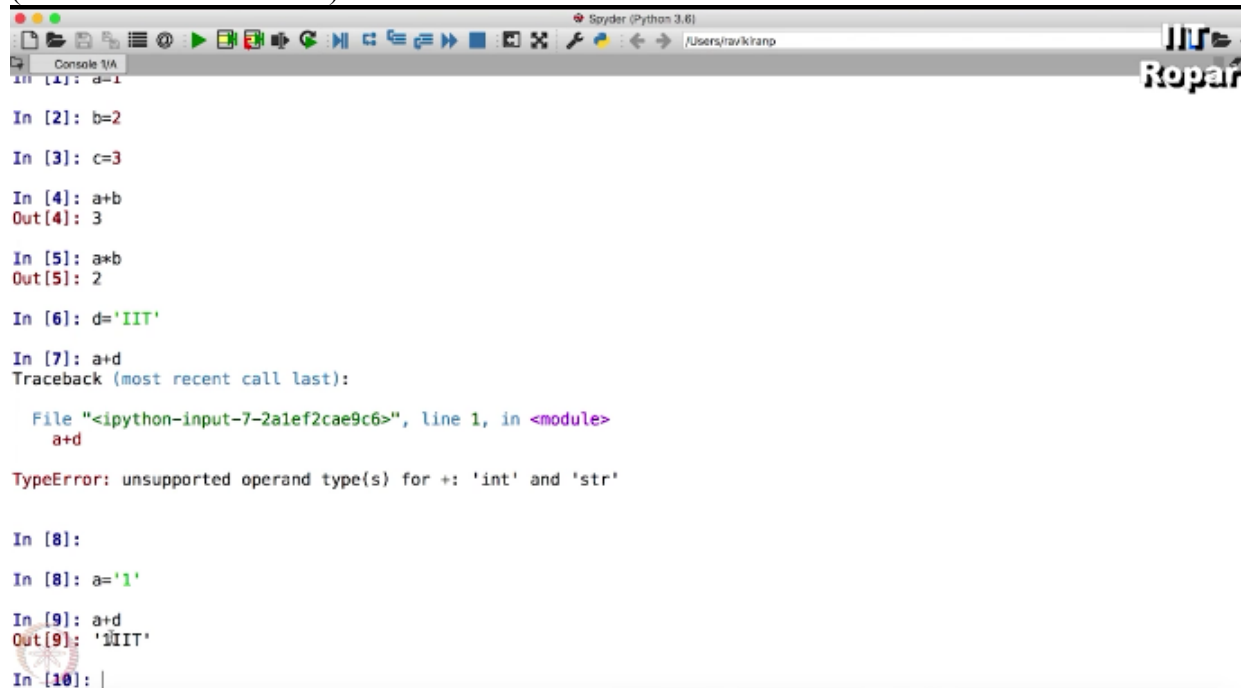


```
In [3]: c=3
In [4]: a+b
Out[4]: 3
In [5]: a*b
Out[5]: 2
In [6]: d='IIT'
In [7]: a+d
Traceback (most recent call last):
  File "<ipython-input-7-2a1ef2cae9c6>", line 1, in <module>
    a+d
TypeError: unsupported operand type(s) for +: 'int' and 'str'

In [8]:
In [8]:
```

I knew this would happen, why? Because you see it says that one is an integer and another one is a string, so it cannot add it up, so what would happen is you see here in input line 1A is an integer, input line 7 I have given it as a+d, but what is input line 6? It says as IIT, this is a string, hence this operation cannot be performed.

Now let me change 1 as, this integer one as another string so what I will do I will give a new value say A is equal to, I will get the same value for A, I'll use the same variable A as string 1, yeah, now I'll add A and D and let us see what happens, yeah see
(Refer Slide Time: 03:30)



```
Python 3.6 Shell
/Users/ravikiranp

In [1]: d=1

In [2]: b=2

In [3]: c=3

In [4]: a+b
Out[4]: 3

In [5]: a*b
Out[5]: 2

In [6]: d='IIT'

In [7]: a+d
Traceback (most recent call last):

  File "<ipython-input-7-2a1ef2cae9c6>", line 1, in <module>
    a+d
TypeError: unsupported operand type(s) for +: 'int' and 'str'

In [8]:

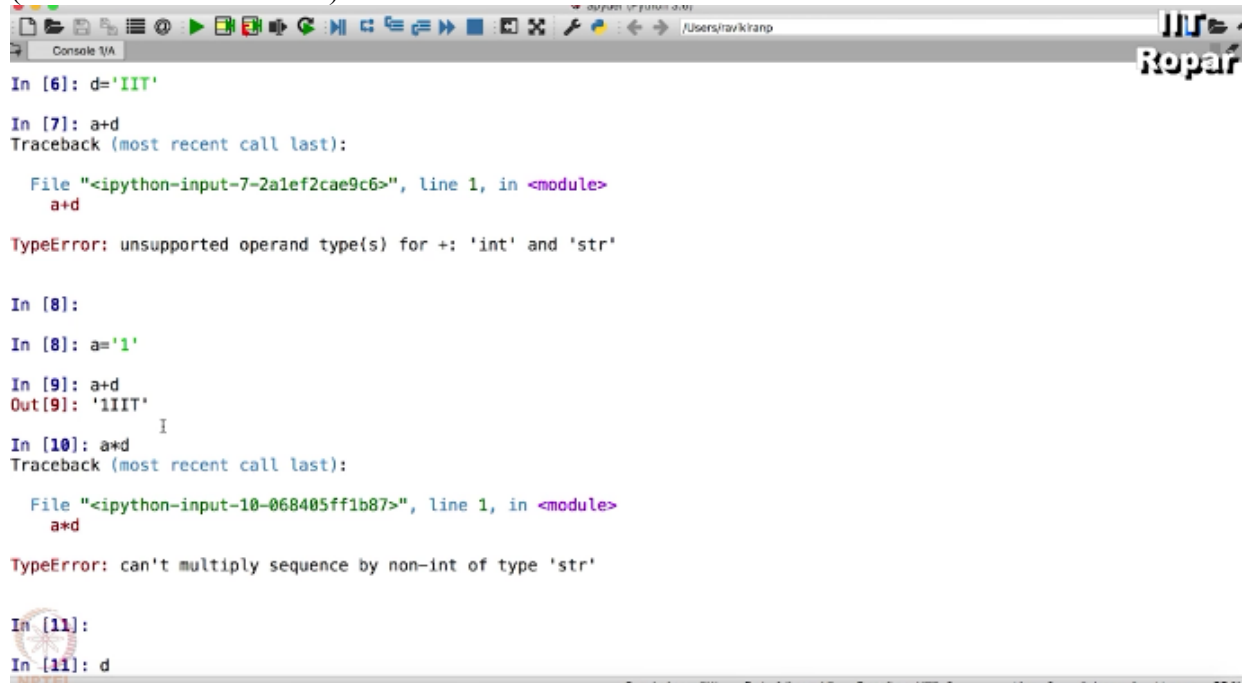
In [8]: a='1'

In [9]: a+d
Out[9]: '1IIT'

In [10]: |
```

there is a 1 here and there is an IIT here, so this is the output.

Now if I do A star D again it cannot multiply it,
(Refer Slide Time: 03:44)



```
Python 3.6 Shell
/Users/ravikiranp

In [6]: d='IIT'

In [7]: a+d
Traceback (most recent call last):

  File "<ipython-input-7-2a1ef2cae9c6>", line 1, in <module>
    a+d
TypeError: unsupported operand type(s) for +: 'int' and 'str'

In [8]:

In [8]: a='1'

In [9]: a+d
Out[9]: '1IIT'

In [10]: a*d
Traceback (most recent call last):

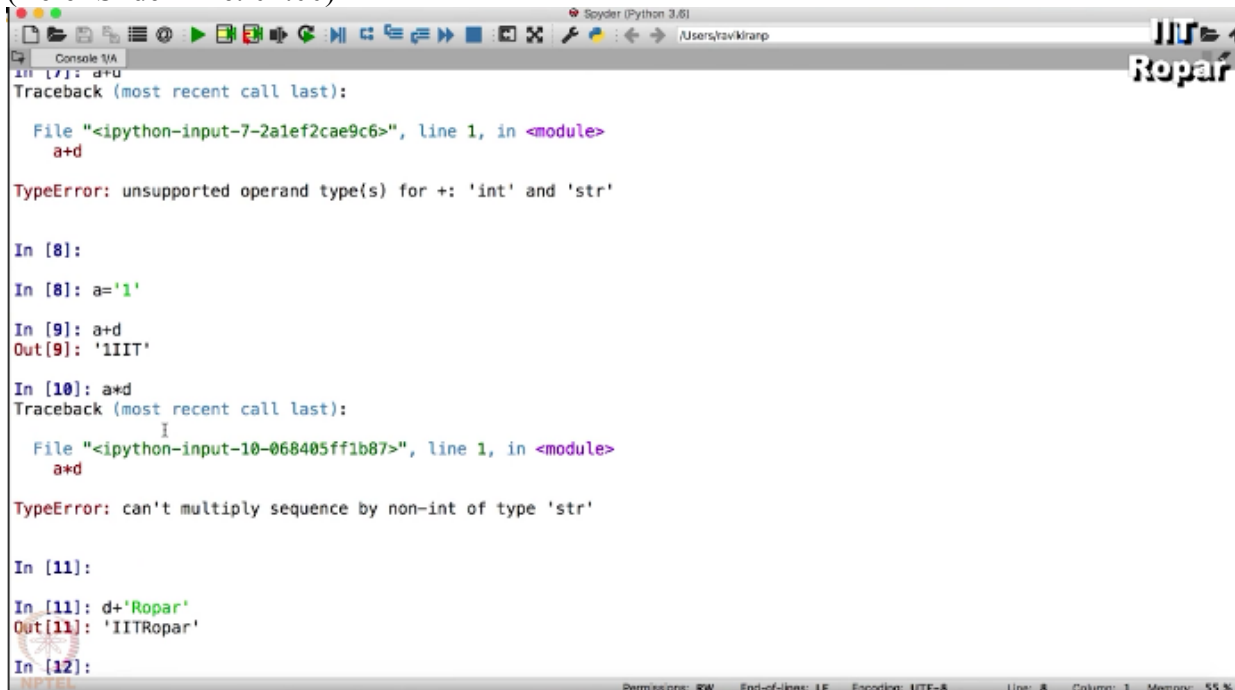
  File "<ipython-input-10-068405ff1b87>", line 1, in <module>
    a*d
TypeError: can't multiply sequence by non-int of type 'str'

In [11]:

In [11]: d
```


now what I'm going to do is I'll add D here, I'll add something to be D, D+ again quotes, because I am going to give some string here, now Ropar in string, Ropar is the string in quotes, so D + Ropar this is what will it be, let us check

(Refer Slide Time: 04:00)



```
File "<ipython-input-7-2a1ef2cae9c6>", line 1, in <module>
a+d
TypeError: unsupported operand type(s) for +: 'int' and 'str'

In [8]:
In [8]: a='1'
In [9]: a+d
Out[9]: '1111'

In [10]: a*d
Traceback (most recent call last):
File "<ipython-input-10-068405ff1b87>", line 1, in <module>
a*d
TypeError: can't multiply sequence by non-int of type 'str'

In [11]:
In [11]: d+'Ropar'
Out[11]: 'IITRopar'

In [12]:
```

did you see it is IIT Ropar, because D was IIT initially, and I've added a string Ropar so it is now going to be IIT Ropar.

Please observe there is no space here before the alphabet R, what if I want space, what I'm going to do is D+ before I start the word Ropar I have given a space you see here so space ROPAR as usual, did you see we have got a space after IIT and before Ropar,

(Refer Slide Time: 04:36)

```
File <ipython-input-7-2a1e2ca95c0>, line 1, in <module>
a+d

TypeError: unsupported operand type(s) for +: 'int' and 'str'

In [8]:
In [8]: a='1'
In [9]: a+d
Out[9]: '1111'
In [10]: a*d
Traceback (most recent call last):
  File "<ipython-input-10-068405ff1b87>", line 1, in <module>
    a*d
TypeError: can't multiply sequence by non-int of type 'str'

In [11]:
In [11]: d+'Ropar'
Out[11]: 'IITRopar'
In [12]: d+' Ropar'
Out[12]: 'IIT Ropar'
In [13]: |
```

so you can play around like this with this basic operations, and what I am going to now do is I am going to introduce a new library here, where I'll use that library and perform certain operations again, so what will be going to do now is we'll be seeing how to generate some integers, how do we generate some random integers, so the library which I will be using is import random, so this is the one which I will be using (Refer Slide Time: 05:10)

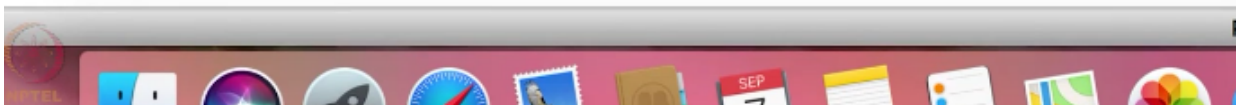
TypeError: can't multiply sequence by non-int of type 'str'

In [11]:

```
In [11]: d+'Ropar'
Out[11]: 'IITRopar'
```

```
In [12]: d+' Ropar'
Out[12]: 'IIT Ropar'
```

```
In [13]: import random
```



this is the library, random is the library which I will be using, so what do you understand by this word import, you're getting something from somewhere right, so I have got this library now and I can use it for my further operations.

So what would be the next step, so we have this library imported now, what I am going to do next is `random.randint`, now within this I am going to give a range let me say 20, so what this step is going to do is now it has imported the library `random`, it will give me a random integer between 1 and 20, so let me see, yes we have got a test 12, let me check again, it is 15,

(Refer Slide Time: 06:03)

```
Out[11]: IIT Ropar
```

IIT
Ropar

```
In [12]: d+' Ropar'
```

```
Out[12]: 'IIT Ropar'
```

```
In [13]: import random
```

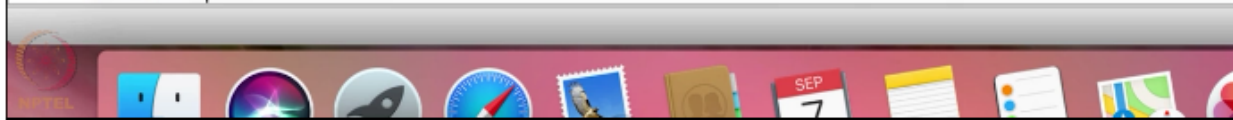
```
In [14]: random.randint(1,20)
```

```
Out[14]: 12
```

```
In [15]: random.randint(1,20)
```

```
Out[15]: 15
```

```
In [16]: |
```



did you see I didn't type `random.randint 1, 20` again, what I'm going to do is just press the up arrow in your keyboard, and you can see that the previous command comes in your input line (Refer Slide Time: 06:17)

```
Out[11]: 'IITRopar'
```

IIT
Ropar

```
In [12]: d+' Ropar'
```

```
Out[12]: 'IIT Ropar'
```

```
In [13]: import random
```

```
In [14]: random.randint(1,20)
```

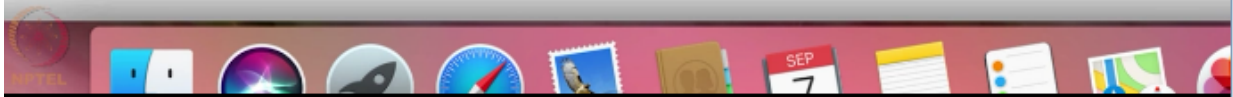
```
Out[14]: 12
```

I

```
In [15]: random.randint(1,20)
```

```
Out[15]: 15
```

```
In [16]: random.randint(1,20)
```



now again I have pressed it, now that is giving me 18, once again 5, once again 1
(Refer Slide Time: 06:26)

IIT
Ropar

```
In [11]:
```

```
In [11]: d+'Ropar'
```

```
Out[11]: 'IITRopar'
```

```
In [12]: d+' Ropar'
```

```
Out[12]: 'IIT Ropar'
```

```
In [13]: import random
```

```
In [14]: random.randint(1,20)
```

```
Out[14]: 12
```

```
In [15]: random.randint(1,20)
```

```
Out[15]: 15
```

```
In [16]: random.randint(1,20)
```

```
Out[16]: 18
```

```
In [17]: random.randint(1,20)
```

```
Out[17]: 5
```

I

```
In [18]: random.randint(1,20)
```

```
Out[18]: 1
```

```
In [19]:
```

Permissions: RW End-of-lines: LF Encoding: UTF-8 Line:

so you have seen that we have generated 5 integers between 1 and 20, now the moment I just type random and press tab space and then tap, the moment I press random. and then tap do you see we have a series of some operations here,
(Refer Slide Time: 06:45)

```
Console 1/A
d#U

TypeError: can't multiply sequence by non-int of type 'str'

In [11]:
In [11]: d+'Ropar'
Out[11]: 'IITRopar'

In [12]: d+' Ropar'
Out[12]: 'IIT Ropar'

In [13]: import random

In [14]: random.randint(1,20)
Out[14]: 12

In [15]: random.randint(1,20)
Out[15]: 15

In [16]: random.randint(1,20)
Out[16]: 18
random.gammavariate
random.gauss
random.getrandbits
random.getstate
random.lognormvariate
random.normalvariate
random.paretovariate
random.randint

In [17]: random.
Out[17]: 5

In [18]: random.
Out[18]: 1

In [19]: random.
Permissions: RW End-of-lines: LF Encoding: UTF-8 Line: 8 Column: 1 Memory: 55%
```

basically you can try all this yourself it is all open for you to explore, do you see something here random.randint, this is what I used now, but let me just take this random.choice (Refer Slide Time: 06:59)

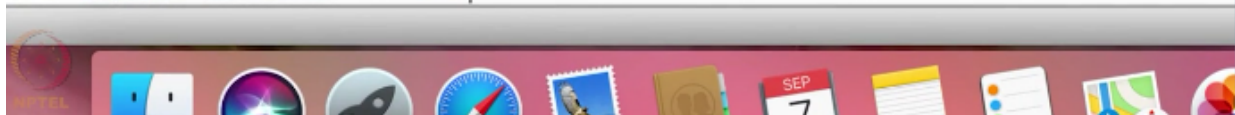
```
In [15]: random.randint(1,20)
Out[15]: 15
```

```
In [16]: random.randint(1,20)
Out[16]: 18
```

```
In [17]: random.randint(1,20)
Out[17]: 5
```

```
In [18]: random.randint(1,20)
Out[18]: 1
```

```
In [19]: random.choice|
```



so what is this going to do, let me check by putting the question mark, so did you see if we put the question mark, we get the answer for our questions that is it chooses a random element from a non-empty sequence

(Refer Slide Time: 07:13)

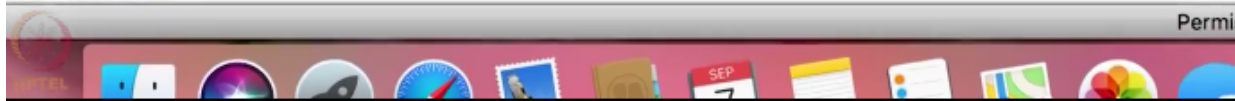
```
In [16]: random.randint(1,20)
Out[16]: 18
```

```
In [17]: random.randint(1,20)
Out[17]: 5
```

```
In [18]: random.randint(1,20)
Out[18]: 1
```

```
In [19]: random.choice?
Signature: random.choice(seq)
Docstring: Choose a random element from a non-empty sequence.
File:      ~/anaconda3/lib/python3.6/random.py
Type:      method
```

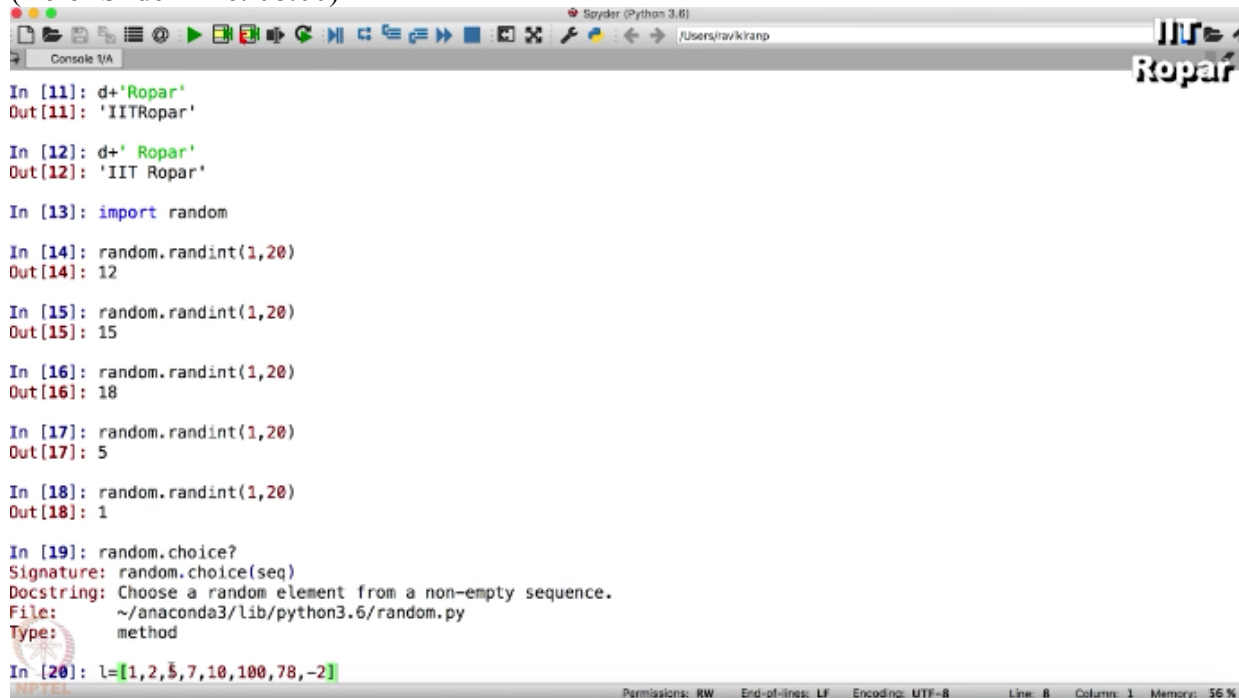
In [20]:



and how do I have to give that, you can see here if it is given by signature, random.choice sequence, so in bracket if I mention the sequence it will generate a random element.

So now let me try that out random.choice and then bracket I have to give a sequence, did you see? So first we have to give a sequence, yes, so let me type it as L, L is equal to, please note here you have to use square brackets, so let me give some sequence 1, 2, 5, 7, 10, 100, 78 and -2 yeah,

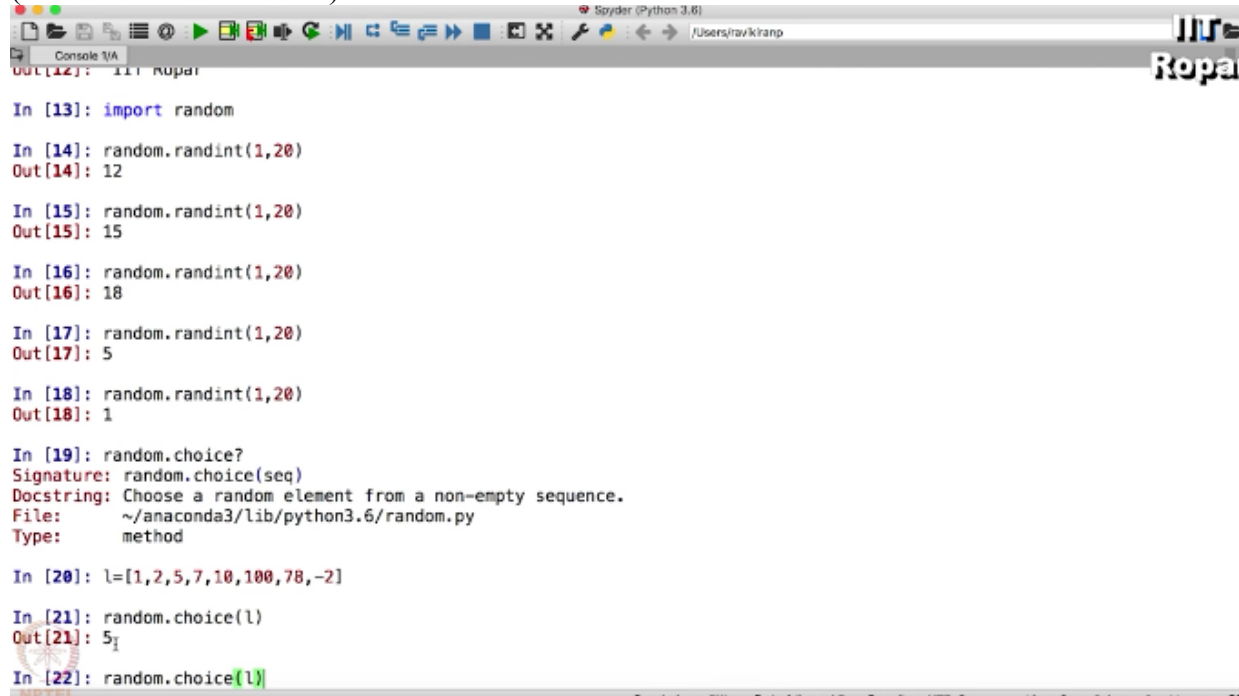
(Refer Slide Time: 08:00)



so this is my sequence of numbers.

Now I have already given L as the sequence, now what I'm going to do is random.choice and L in bracket, let's see it is showing a random number from this sequence which is fine, I'm going to use up arrow again here,

(Refer Slide Time: 08:26)



```
Out[12]: 11 Rupa

In [13]: import random

In [14]: random.randint(1,20)
Out[14]: 12

In [15]: random.randint(1,20)
Out[15]: 15

In [16]: random.randint(1,20)
Out[16]: 18

In [17]: random.randint(1,20)
Out[17]: 5

In [18]: random.randint(1,20)
Out[18]: 1

In [19]: random.choice?
Signature: random.choice(seq)
Docstring: Choose a random element from a non-empty sequence.
File: ~/anaconda3/lib/python3.6/random.py
Type: method

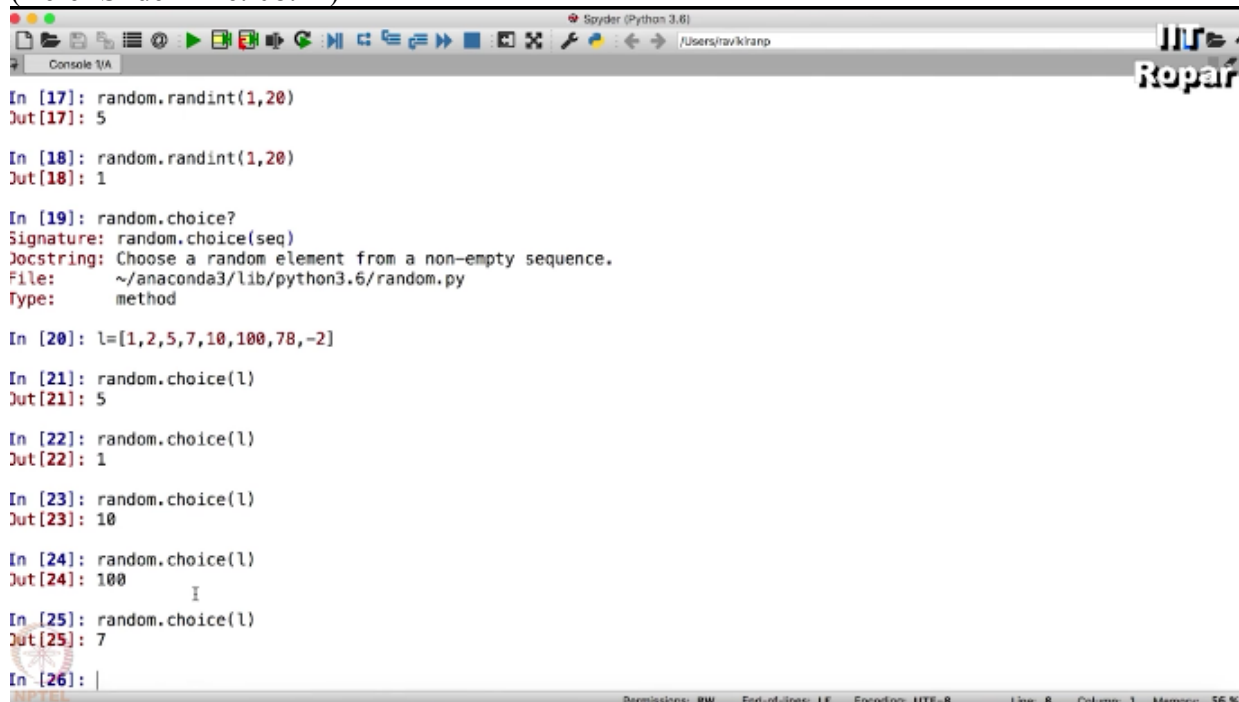
In [20]: l=[1,2,5,7,10,100,78,-2]

In [21]: random.choice(l)
Out[21]: 5

In [22]: random.choice(l)
```

so I get my command, enter gives me 1, once again gives me 10, once again gives me 100, did you see, so all the integers generated here are from this sequence L which was given as an input, the last one 7,

(Refer Slide Time: 08:42)



```
In [17]: random.randint(1,20)
Out[17]: 5

In [18]: random.randint(1,20)
Out[18]: 1

In [19]: random.choice?
Signature: random.choice(seq)
Docstring: Choose a random element from a non-empty sequence.
File: ~/anaconda3/lib/python3.6/random.py
Type: method

In [20]: l=[1,2,5,7,10,100,78,-2]

In [21]: random.choice(l)
Out[21]: 5

In [22]: random.choice(l)
Out[22]: 1

In [23]: random.choice(l)
Out[23]: 10

In [24]: random.choice(l)
Out[24]: 100

In [25]: random.choice(l)
Out[25]: 7

In [26]: |
```

so you've just seen the library which was imported called random, now we will be introducing you to a more relevant library which we'll be using in this week for the chapter graph theory, and coming 1 or 2 weeks and we'll be introducing you to that library in the next video, you are free to explore more on Python this was just an introduction to Python for you to play around and understand how it works, so we'll be now moving on to the library called as NetworkX, we'll be giving more details in the next video.

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