

Mathematics

Lecture 10

MAT 112
Math by Python

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Lecture 10

Lecture Objectives

Study how to download python

Learn how to run different codes with Python for factorization

Learn how to run different codes with Python for graphing functions

Learn how to run different codes with Python for solving limits

Learn how to run different codes with Python for differential

Learn how to run different codes with Python for Integration

- 1- Download Python (**Anaconda**) – Use **Jupyter** Notebook.
- 2- Python for factorization
- 3- Python for graphing functions
- 4- Python for solving limits
- 5- Python for differential
- 6- Python for Integration

1- Go to the technical engineer to set up the program called Anaconda.

2- Use Jupyter **ONLINE**.

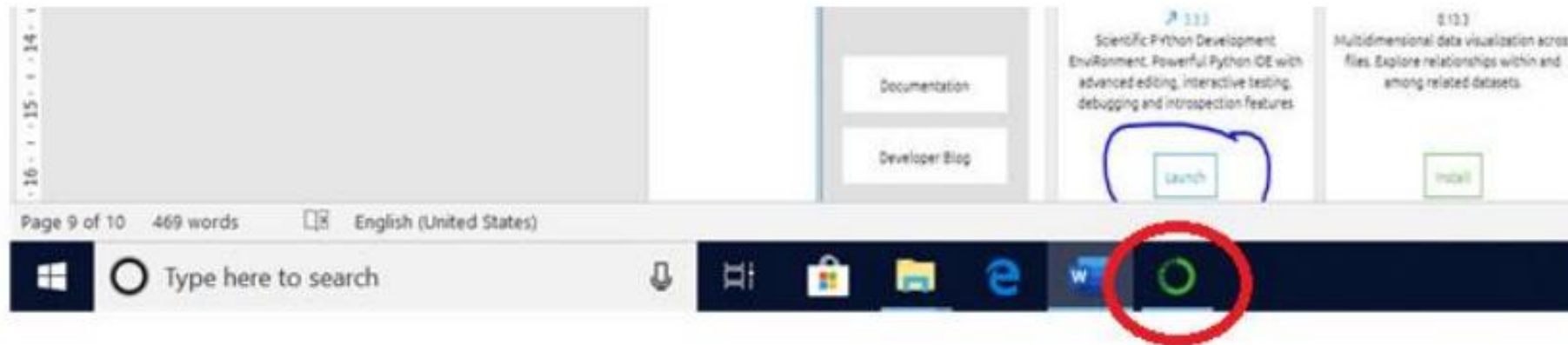
OR

☐ Solve all the problems manually.

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How to open the program ?

You will see that the Anaconda Navigator icon appears on the bottom toolbar. Click on the icon to see the contents of Navigator.

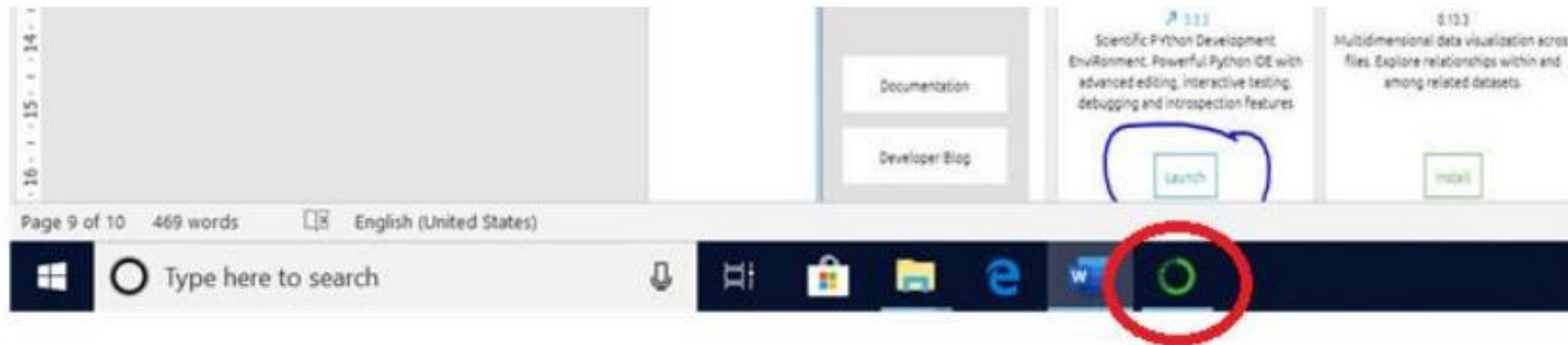


You will see that following page appears showing different options available which you can use.

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How to open the program ?

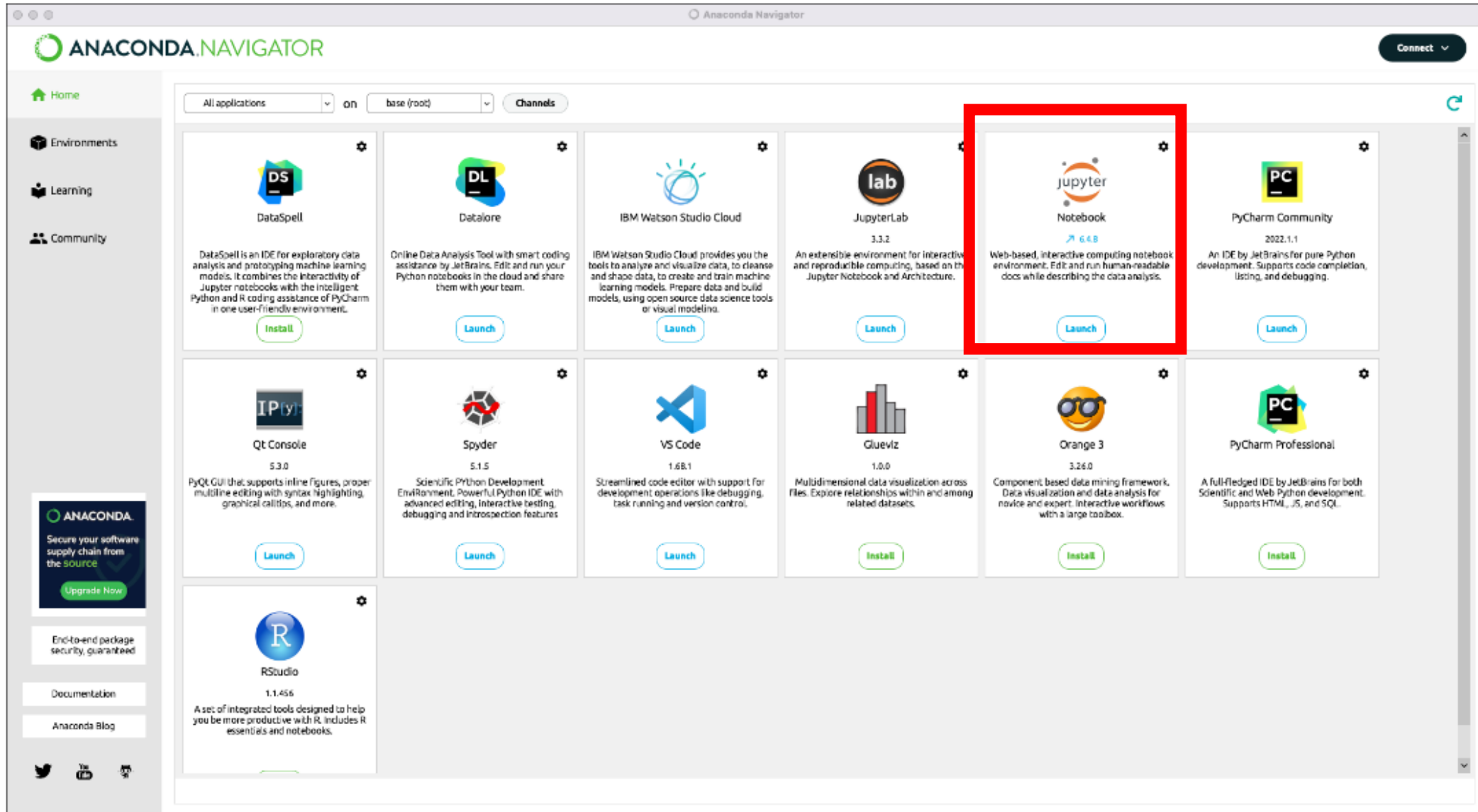
You will see that the Anaconda Navigator icon appears on the bottom toolbar. Click on the icon to see the contents of Navigator.



You will see that following page appears showing different options available which you can use.

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How to open the program ?



Lecture 10

Jupyter Interface



Quit

Logout

Files

Running

Clusters

Nbextensions

Select items to perform actions on them.

Upload

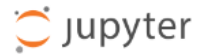
New ▾



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☐	📁 Contacts		4 months ago	
☐	📁 Creative Cloud Files		16 hours ago	
☐	📁 Desktop		17 hours ago	
☐	📁 Documents		17 hours ago	
☐	📁 Downloads		2 minutes ago	
☐	📁 Favorites		4 months ago	
☐	📁 Links		4 months ago	
☐	📁 Microsoft		4 months ago	
☐	📁 Music		4 months ago	

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Open new file in Jupyter



Quit

Logout

Files

Running

Clusters

Nbextensions

Select items to perform actions on them.

Upload

New



☐ 0		Name	Last Modified	File size
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☐	ansel		3 months ago	
☐	Contacts		4 months ago	
☐	Creative Cloud Files		16 hours ago	
☐	Desktop		17 hours ago	
☐	Documents		17 hours ago	
☐	Downloads		2 minutes ago	
☐	Favorites		4 months ago	
☐	Links		4 months ago	
☐	Microsoft		4 months ago	

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Open new file in Jupyter

The screenshot displays the JupyterLab web interface. At the top, there's a header with the 'jupyter' logo and 'Quit' and 'Logout' buttons. Below the header, there are tabs for 'Files', 'Running', 'Clusters', and 'Nbextensions'. The 'Files' tab is active, showing a file browser. A red box highlights the 'New' button in the top right corner of the file browser. A dropdown menu is open, showing options: 'Python 3 (ipykernel)', 'Text File', 'Folder', and 'Terminal'. The 'Python 3 (ipykernel)' option is highlighted. A tooltip message says 'Create a new notebook with Python 3 (ipykernel)'.

jupyter

Quit Logout

Files Running Clusters Nbextensions

Select items to perform actions on them.

0 /

☐	ansel	
☐	Contacts	
☐	Creative Cloud Files	
☐	Desktop	
☐	Documents	
☐	Downloads	
☐	Favorites	
☐	Links	
☐	Microsoft	
☐	Music	

Python 3 (ipykernel)

Text File

Folder

Terminal

17 hours ago

7 minutes ago

4 months ago

4 months ago

4 months ago

4 months ago

Create a new notebook with Python 3 (ipykernel)

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New Notebook

jupyter calculus by Python Last Checkpoint: 2 minutes ago (autosaved)



Logout

File Edit View Insert Cell Kernel Widgets Help

Trusted

Python 3 (ipykernel)



In []:

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New Notebook

jupyter calculus by Python Last Checkpoint: 2 minutes ago (autosaved)



Logout

File Edit View Insert Cell Kernel Widgets Help

Trusted

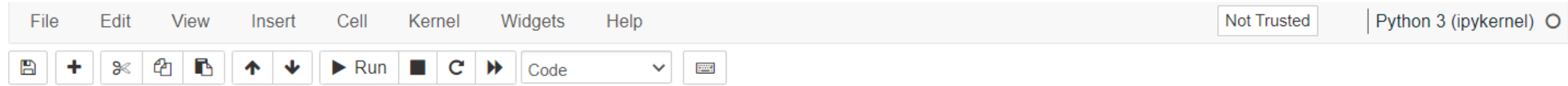
Python 3 (ipykernel)



In []:

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Sympy Package



```
In [1]: from sympy import init_session
init_session()
```

IPython console for SymPy 1.10.1 (Python 3.9.12-64-bit) (ground types: python)

These commands were executed:

```
>>> from sympy import *
>>> x, y, z, t = symbols('x y z t')
>>> k, m, n = symbols('k m n', integer=True)
>>> f, g, h = symbols('f g h', cls=Function)
>>> init_printing()
```

Documentation can be found at <https://docs.sympy.org/1.10.1/>

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Sympy Package

```
In [2]: import sympy  
dir(sympy)
```

```
Out[2]: ['Abs',  
        'AccumBounds',  
        'Add',  
        'Adjoint',  
        'AlgebraicField',  
        'AlgebraicNumber',  
        'And',  
        'AppliedPredicate',  
        'Array',  
        'AssumptionsContext',  
        'Atom',  
        'AtomicExpr',  
        'BasePolynomialError',  
        'Basic',  
        'BlockDiagMatrix',  
        'BlockMatrix',  
        'CC',  
        'CRootOf',  
        'Catalan',
```

Solving Equations and Working With Math Functions

```
In [3]: f = x**2 - 9
```

```
Out[3]:  $x^2 - 9$ 
```

```
In [ ]: f
```

```
In [4]: solve(f,x)
```

```
Out[4]: [-3, 3]
```

Factorization

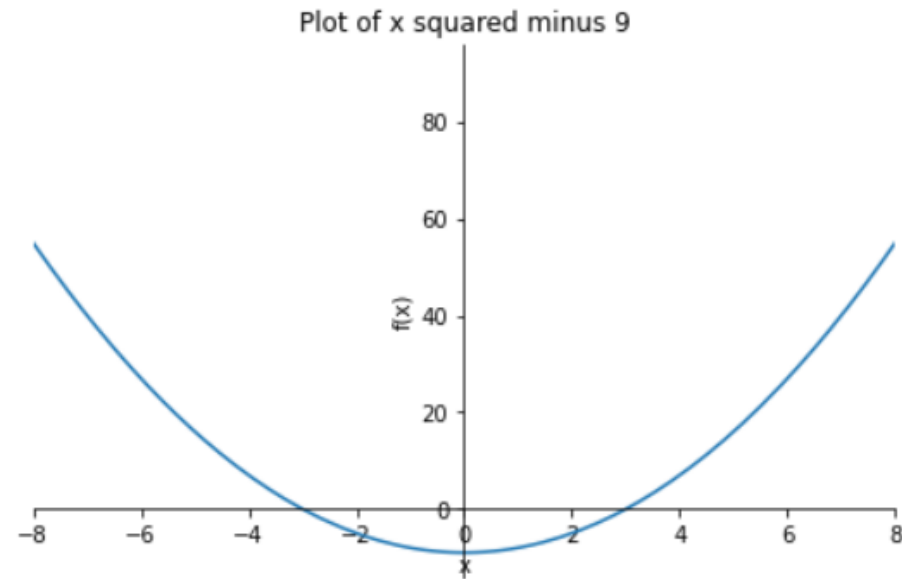
In [5]: `factor(f)`

Out[5]: $(x - 3)(x + 3)$

Graph function

```
In [6]: %matplotlib inline  
p = plot(f, xlim=(-8, 8), show=False,  
        title="Plot of x squared minus 9")
```

```
In [7]: p.show()
```



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Writing Root

```
In [8]: g = sqrt(x)/(1-x**2)
```

```
In [9]: g
```

```
Out[9]: 
$$\frac{\sqrt{x}}{1-x^2}$$

```

Limits

```
In [10]: k = (x**2 - 25)/(x**2 + 2 * x - 15)
```

```
In [11]: k
```

```
Out[11]: 
$$\frac{x^2 - 25}{x^2 + 2x - 15}$$

```

```
In [12]: limit(k,x,-5)
```

```
Out[12]: 
$$\frac{5}{4}$$

```

Differential

```
In [13]: M= 4*x**3 + sin(x) - 19
```

```
In [14]: diff(M)
```

```
Out[14]: 12x2 + cos(x)
```

Integration

```
In [7]: V = 5 * x**3
```

```
In [8]: integrate(V)
```

```
Out[8]:  $\frac{5x^4}{4}$ 
```

Integration

```
In [6]: N = 12 * x**2 + cos(x)
```

```
In [16]: integrate(N)
```

```
Out[16]:  $4x^3 + \sin(x)$ 
```

1- Download Python

2- Python for factorization

factor(f)

3- Python for graphing functions

plot(f)

4- Python for solving limits

limit(f,x,3)

5- Python for differential

diff(f)

6- Python for Integration

integrate(f)
