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Python Pandas Tutorial in Hindi

CodeWithHarry · 968K views · 4 years ago

⋮

The screenshot shows a Jupyter Notebook interface running in a web browser. The title bar indicates it's an 'Untitled' notebook on 'localhost:8888'. The toolbar includes standard file operations (File, Edit, View, Insert, Cell, Kernel, Widgets, Help), a Python 3 kernel selector, and a 'Trusted' status. Below the toolbar are various cell controls: file, new, cell type, cell movement, run, cell style, and code execution.

In [1]:

```
import numpy as np
import pandas as pd
```

In [2]:

```
dict1 = {
    "name":['harry', 'rohan', 'skillf', 'shubh'],
    "marks": [92, 34, 24, 17],
    "city": ['rampur', 'kolkata', 'bareilly', 'antarctica']
}
```

In []:

The screenshot shows a Jupyter Notebook interface running in a web browser. The title bar indicates the notebook is titled "Untitled" and is autosaved. The toolbar includes standard file operations like Open, Save, and New, along with Run, Kernel, and Help buttons. A Python 3 kernel icon is present, and the status bar shows the notebook is "Trusted".

In [3]:

```
"marks": [92, 34, 24, 17],  
"city": ['rampur', 'kolkata', 'bareilly', 'antarctica']  
}
```

In [4]:

```
df = pd.DataFrame(dict1)
```

Out[4]:

	name	marks	city
0	harry	92	rampur
1	rohan	34	kolkata
2	skillf	24	bareilly
3	shubh	17	antarctica

In []:

Home Untitled

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jupyter Untitled (unsaved changes) Logout

File Edit View Insert Cell Kernel Widgets Help Trusted Python 3

In [3]: df = pd.DataFrame(dict1)

In [4]: df

Out[4]:

	name	marks	city
0	harry	92	rampur
1	rohan	34	kolkata
2	skillf	24	bareilly
3	shubh	17	antarctica

In []: df.to_csv('friends.csv')

Type here to search

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Logout

File Edit View Insert Cell Kernel Widgets Help Trusted Python 3

```
"marks":[92, 34, 24, 17],  
"city":['rampur', 'kolkata', 'bareilly', 'antarctica']  
}
```

In [3]: df = pd.DataFrame(dict1)

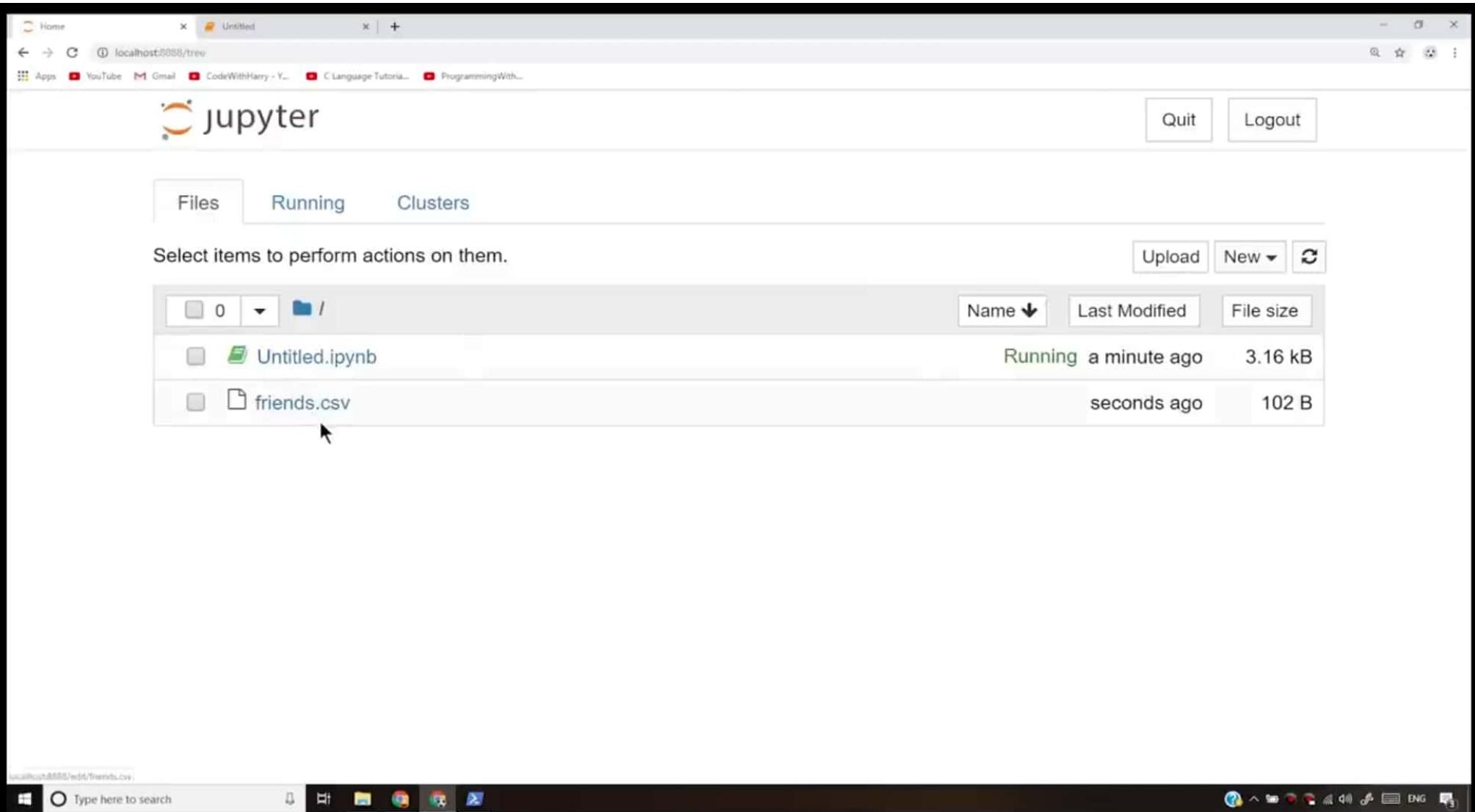
In [4]: df

Out[4]:

	name	marks	city
0	harry	92	rampur
1	rohan	34	kolkata
2	skillf	24	bareilly
3	shubh	17	antarctica

In []: df.to_csv('friends.csv')

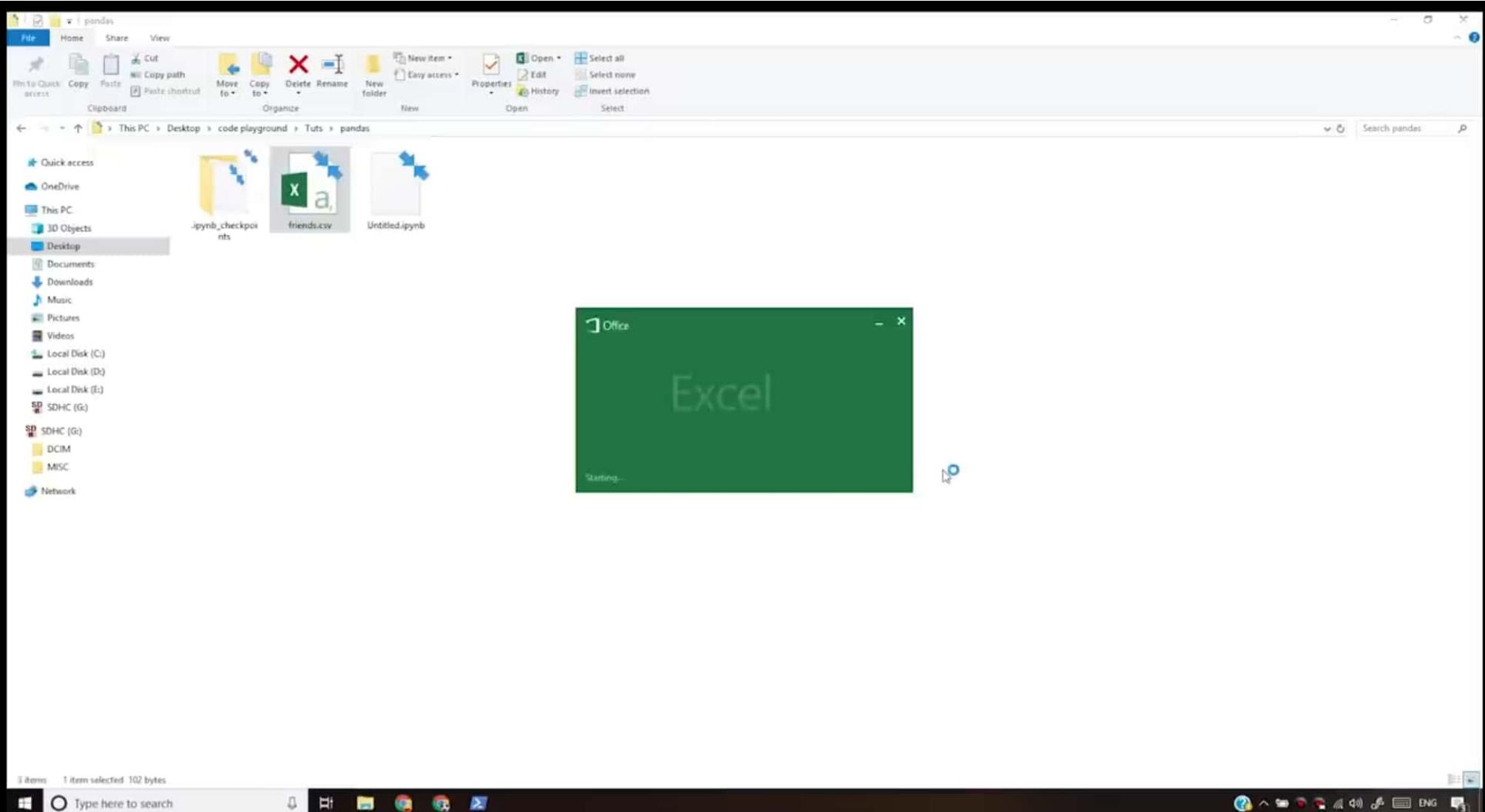
Type here to search

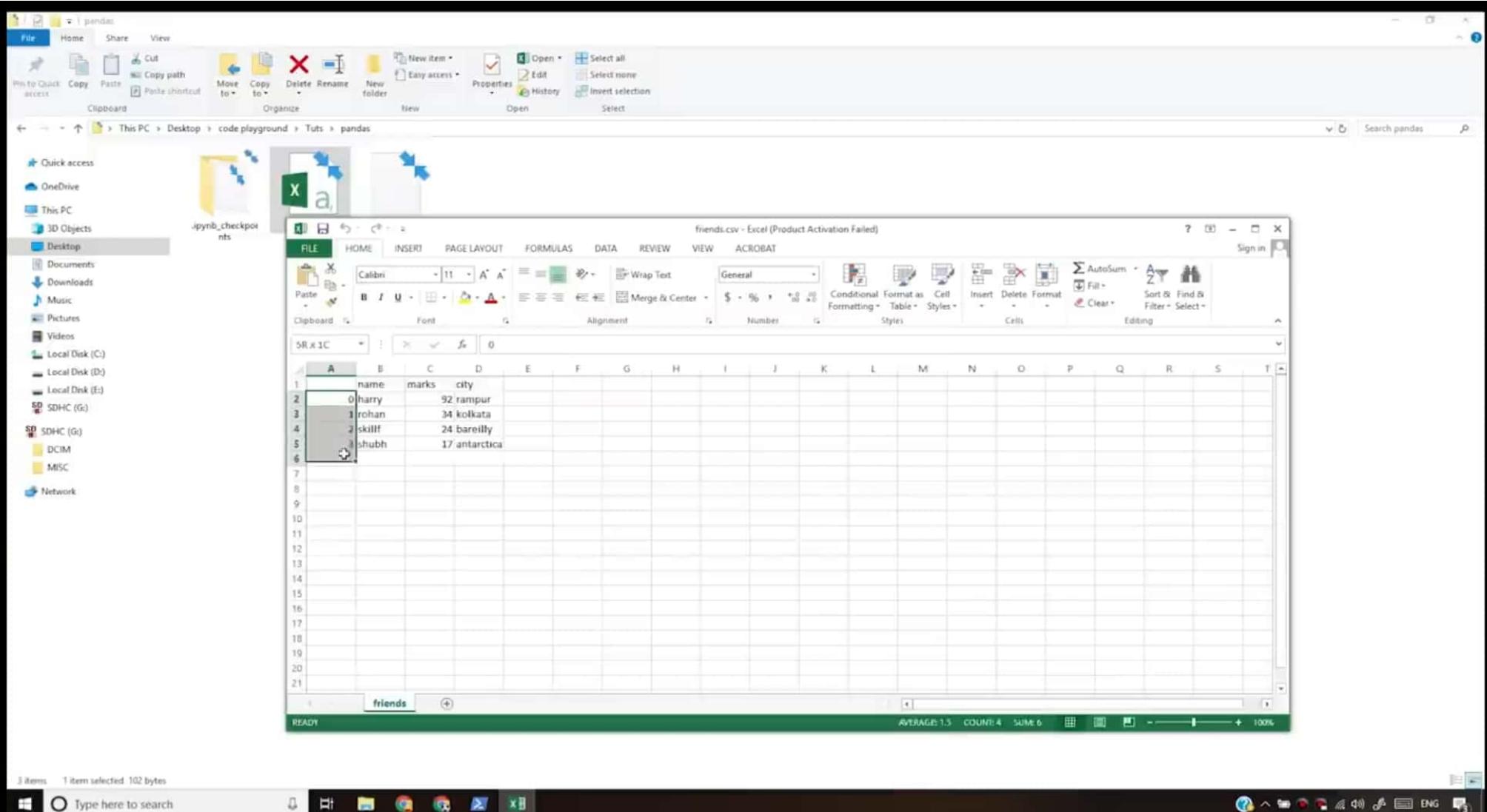


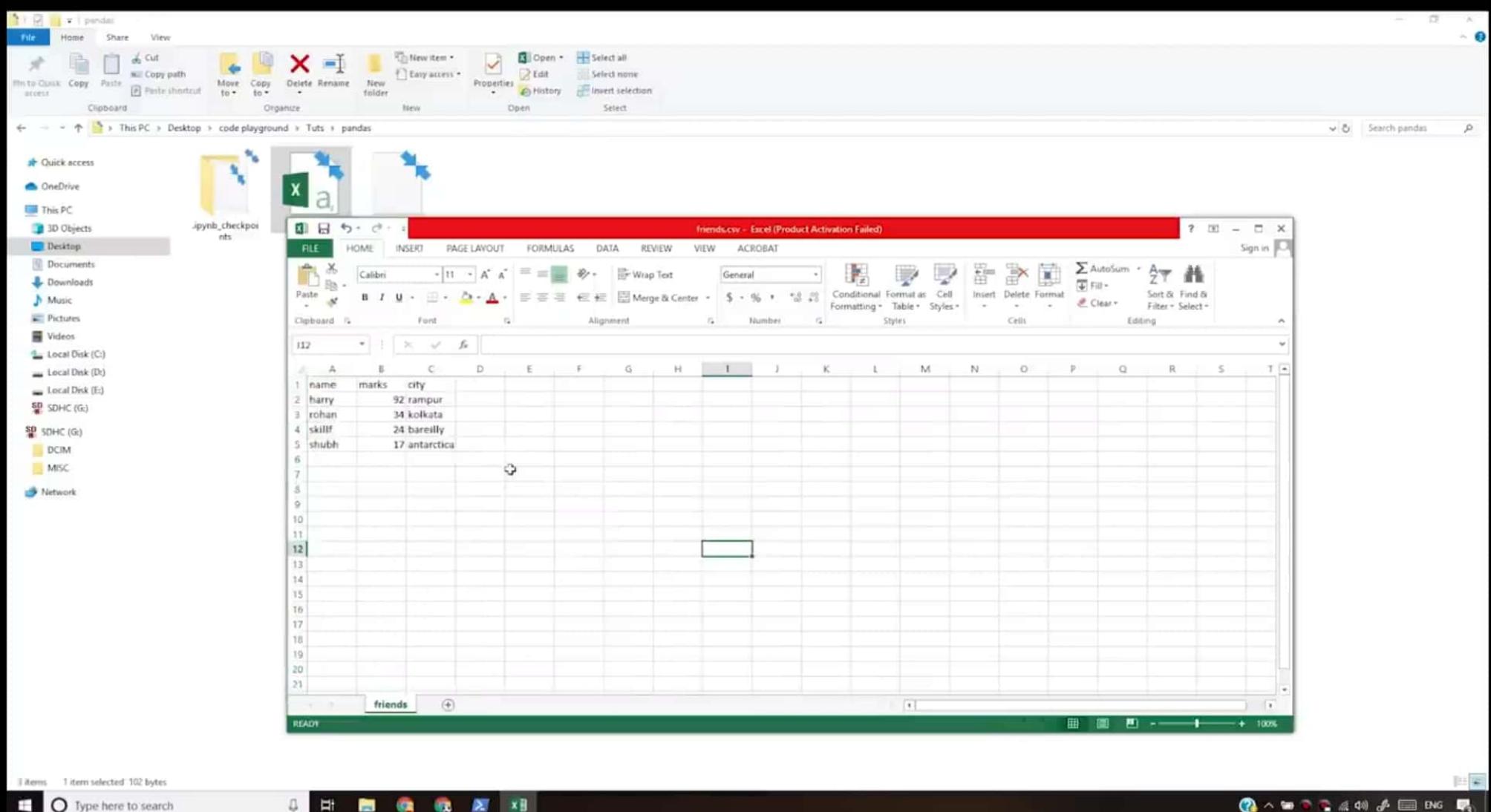
A screenshot of a Jupyter Notebook interface running in a web browser. The title bar shows "jupyter Untitled (unsaved changes)". The toolbar includes standard file operations like Open, Save, and New, along with Run, Cell, Kernel, Widgets, Help, and a Python 3 kernel selector. A "Trusted" button is also present. The main area displays the output of cell 4, which is a DataFrame:

	name	marks	city
0	harry	92	rampur
1	rohan	34	kolkata
2	skillf	24	bareilly
3	shubh	17	antarctica

The input cell 5 contains the command `df.to_csv('friends.csv')`. The status bar at the bottom shows the Windows taskbar with various pinned icons.







A screenshot of a Jupyter Notebook interface running in a web browser. The title bar shows "jupyter Untitled (unsaved changes)". The toolbar includes standard file operations like Save, New, and Delete, along with Run, Cell, Kernel, Widgets, and Help buttons. The status bar indicates the kernel is "Python 3".

The main area displays a DataFrame:

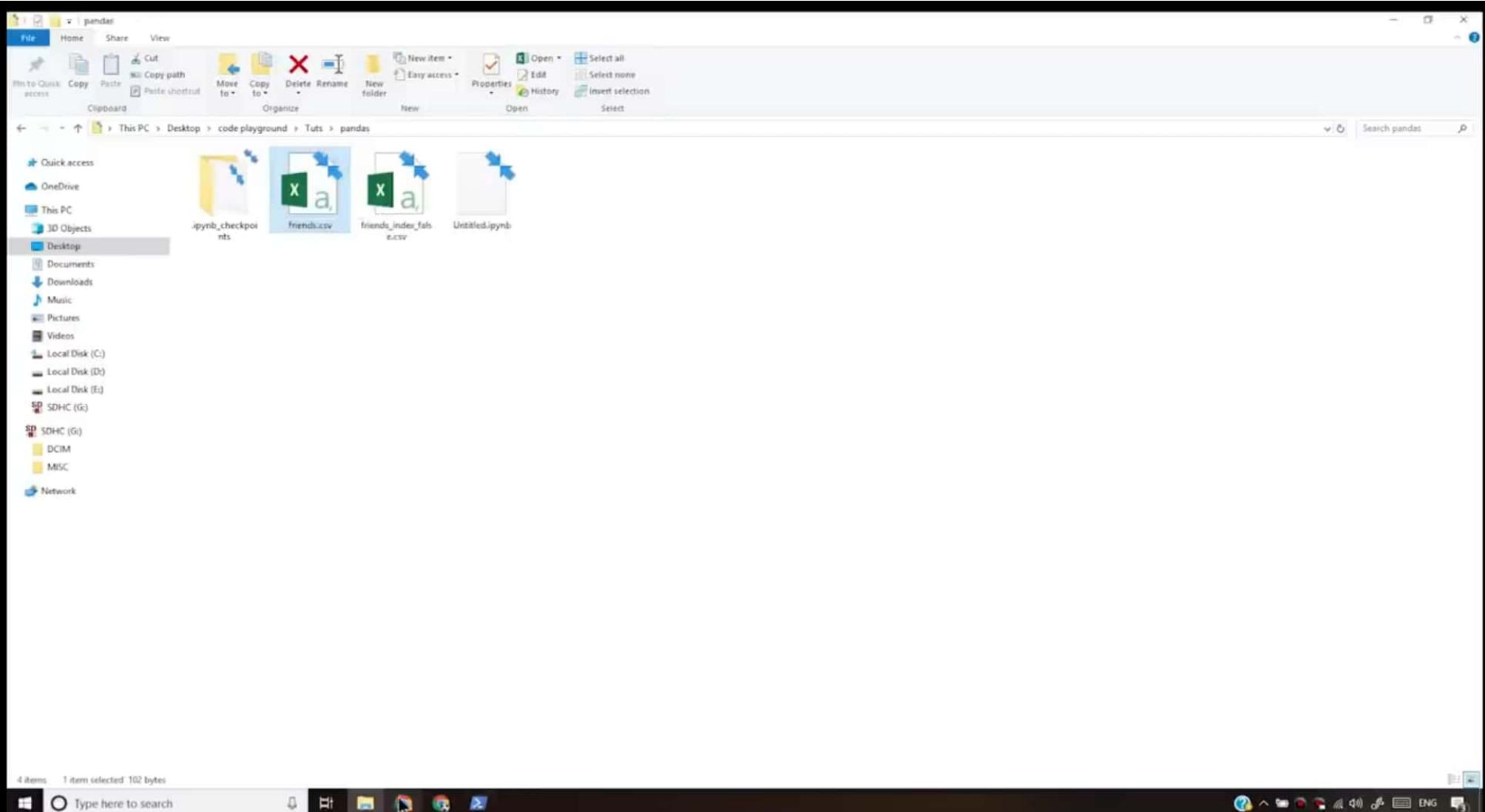
0	harry	92	rampur
1	rohan	34	kolkata
2	skillf	24	bareilly
3	shubh	17	antarctica

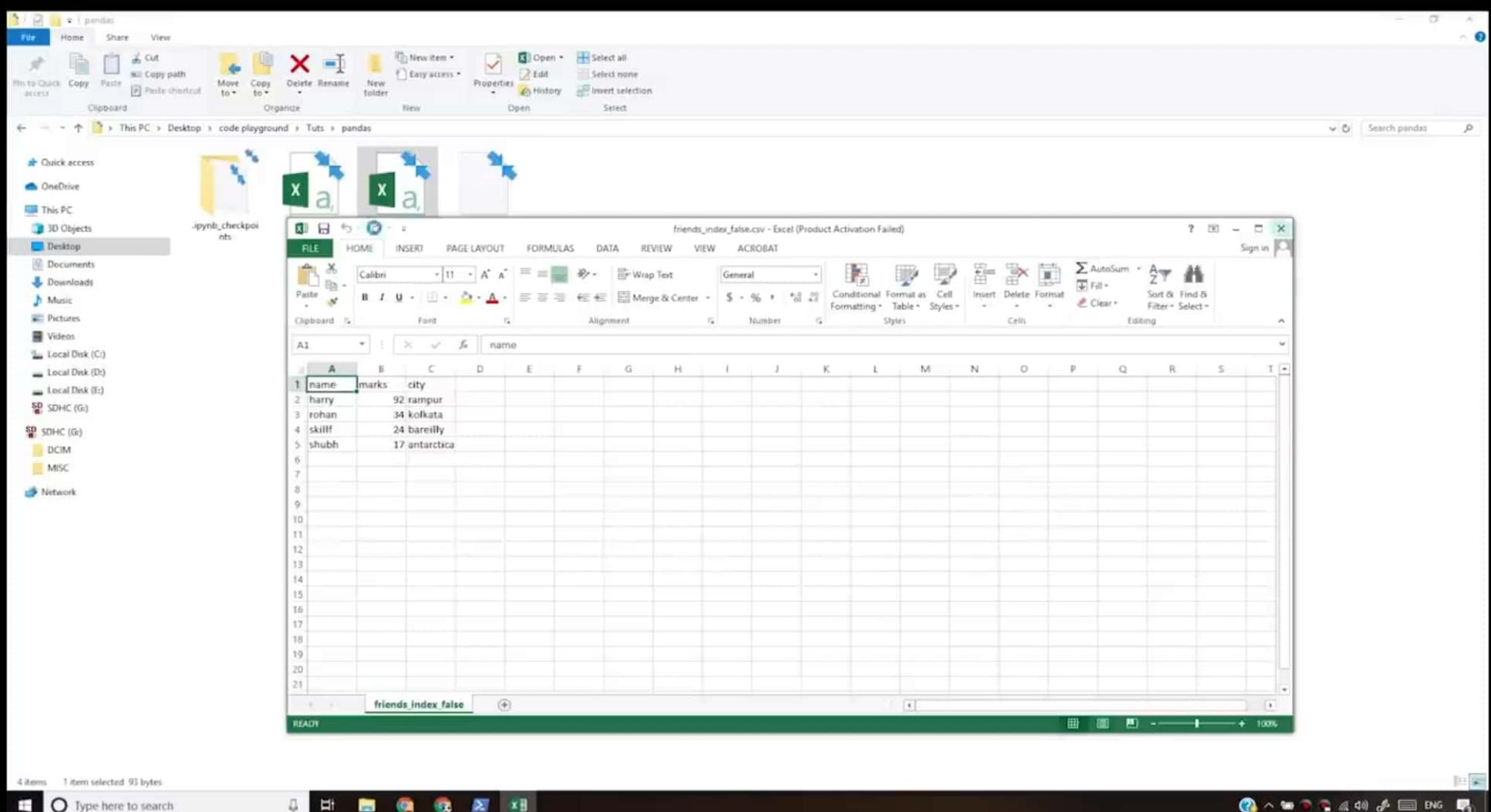
Below the DataFrame, three code cells are shown:

```
In [7]: df.to_csv('friends.csv')
```

```
In [6]: df.to_csv('friends_index_false.csv', index=False)
```

```
In [ ]:
```





The screenshot shows a Jupyter Notebook interface running in a browser window. The title bar indicates the notebook is titled "Untitled" and is currently unsaved. The toolbar includes standard options like File, Edit, View, Insert, Cell, Kernel, Widgets, and Help, along with a Python 3 kernel icon and a Logout button. Below the toolbar is a toolbar with icons for file operations (Save, New, Open, etc.), cell selection (Run, Cell, Cell Block), and code execution (Cell, Run Cell, Run Cell Block). The main workspace displays the following code and its output:

```
2 skillf    24    bareilly
3 shubh     17    antarctica

In [7]: df.to_csv('friends.csv')

In [8]: df.to_csv('friends_index_false.csv', index=False)

In [9]: df.head(2)

Out[9]:


|   | name  | marks | city    |
|---|-------|-------|---------|
| 0 | harry | 92    | rampur  |
| 1 | rohan | 34    | kolkata |



In [ ]: df
```

The bottom taskbar shows the Windows Start button, a search bar, and various pinned application icons.

The screenshot shows a Jupyter Notebook interface running in a web browser. The title bar indicates the notebook is titled "Untitled" and is currently unsaved. The toolbar includes standard file operations like File, Edit, View, Insert, Cell, Kernel, Widgets, and Help, along with a Python 3 kernel selection. Below the toolbar is a toolbar with icons for file operations (Save, New, Open, etc.), cell selection (Run, Cell, Cell Block), and code execution (Cell, Run Cell). The main area displays two code cells and their outputs.

In [9]: `df.head(2)`

Out[9]:

	name	marks	city
0	harry	92	rampur
1	rohan	34	kolkata

In [10]: `df.tail(2)`

Out[10]:

	name	marks	city
2	skillf	24	bareilly
3	shubh	17	antarctica

In []:

The screenshot shows a Jupyter Notebook interface running on a Windows operating system. The browser tab indicates the URL is `localhost:8888/notebooks/Untitled.ipynb?kernel_name=python3`. The notebook title is "Untitled (unsaved changes)". The toolbar includes standard file operations (File, Edit, View, Insert, Cell, Kernel, Widgets, Help), a Python logo icon, and a "Logout" button. The status bar at the bottom shows the Windows taskbar with various pinned icons.

In [3]:

```
df = pd.DataFrame(dict1)
```

In [4]:

```
df
```

Out[4]:

	name	marks	city
0	harry	92	rampur
1	rohan	34	kolkata
2	skillf	24	bareilly
3	shubh	17	antarctica

In [7]:

```
df.to_csv('friends.csv')
```

In [8]:

```
df.to_csv('friends_index_false.csv', index=False)
```

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Logout

File Edit View Insert Cell Kernel Widgets Help Trusted Python 3

Out[9]:

	name	marks	city
0	harry	92	rampur
1	rohan	34	kolkata

In [10]: df.tail(2)

Out[10]:

	name	marks	city
2	skillf	24	bareilly
3	shubh	17	antarctica

In []: df.describe()

This screenshot shows a Jupyter Notebook interface running on a Windows operating system. The notebook has an 'Untitled' title and is using a Python 3 kernel. The top menu bar includes File, Edit, View, Insert, Cell, Kernel, Widgets, and Help, along with a Trusted button and Python 3 dropdown. The toolbar below the menu contains icons for file operations like save, new, and run, as well as cell selection and execution controls. The main workspace displays two code cells and their outputs. The first cell, labeled 'Out[9]', shows a DataFrame with three rows of data: index 0 (name: harry, marks: 92, city: rampur), index 1 (name: rohan, marks: 34, city: kolkata), and index 2 (name: skillf, marks: 24, city: bareilly). The second cell, labeled 'Out[10]', shows a DataFrame with four rows of data: index 2 (name: skillf, marks: 24, city: bareilly) and index 3 (name: shubh, marks: 17, city: antarctica). A third cell, labeled 'In []:', contains the command 'df.describe()' which has been typed but not yet executed. The taskbar at the bottom shows various pinned application icons.

The screenshot shows a Jupyter Notebook interface running in a web browser. The title bar indicates the notebook is titled "Untitled" and is currently unsaved. The top menu bar includes File, Edit, View, Insert, Cell, Kernel, Widgets, and Help. On the right side of the header, there are buttons for Trusted, Logout, and Python 3. Below the menu is a toolbar with various icons for file operations like save, new, and copy, along with run, cell, and code selection buttons.

The main content area displays the output of a cell, labeled "Out[11]:". The output is a statistical summary of a dataset named "marks".

	marks
count	4.00000
mean	41.75000
std	34.21866
min	17.00000
25%	22.25000
50%	29.00000
75%	48.50000
max	92.00000

Below the output, there is an input cell labeled "In []:" with a large empty text area for entering code.

The screenshot shows a Jupyter Notebook interface running in a browser window. The title bar indicates it's an Untitled notebook with a Python 3 kernel. The toolbar includes standard file operations like Open, Save, and New, along with Run, Kernel, and Help buttons. A dropdown menu shows the current kernel is Python 3.

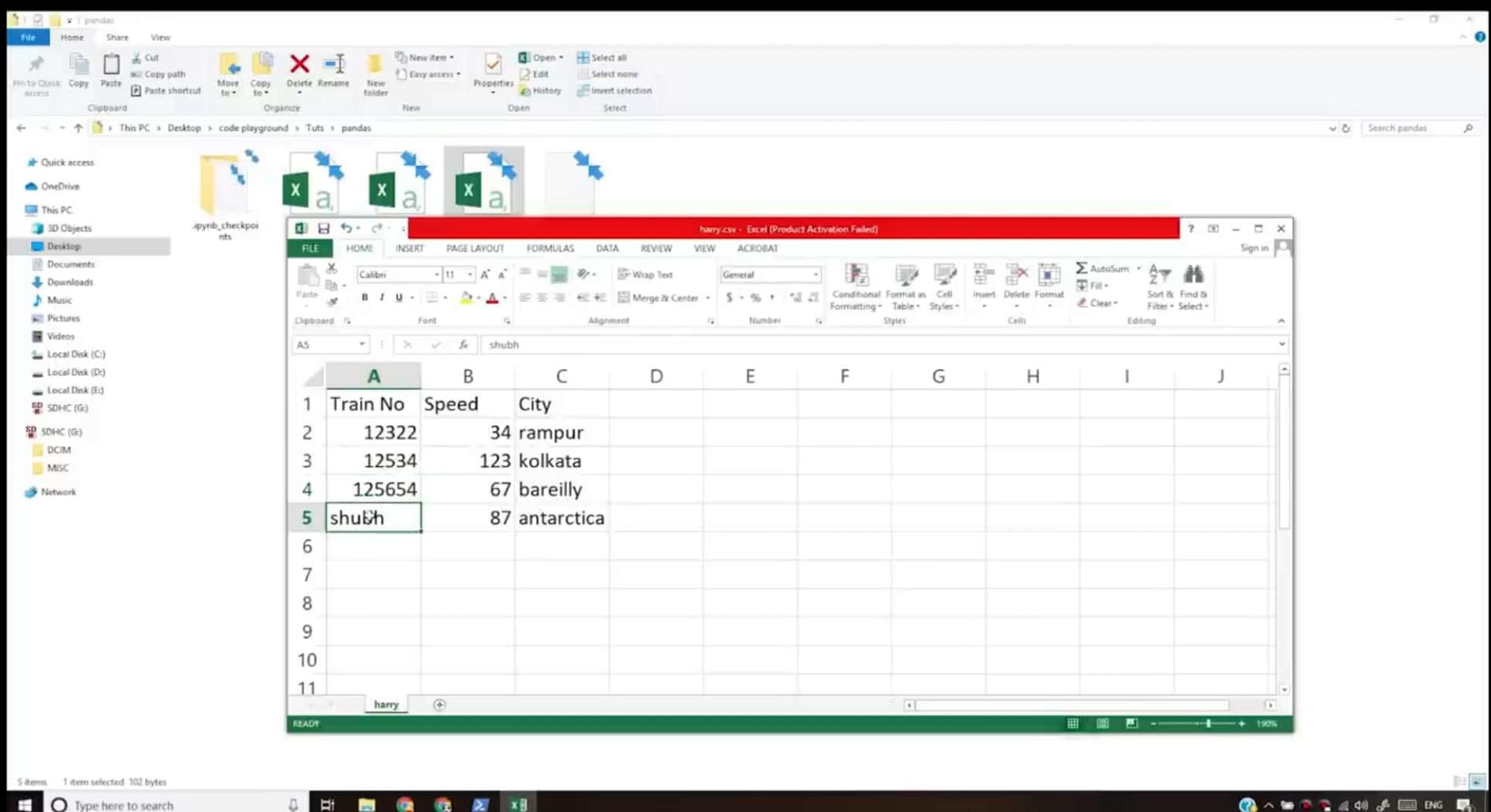
The main area displays two code cells:

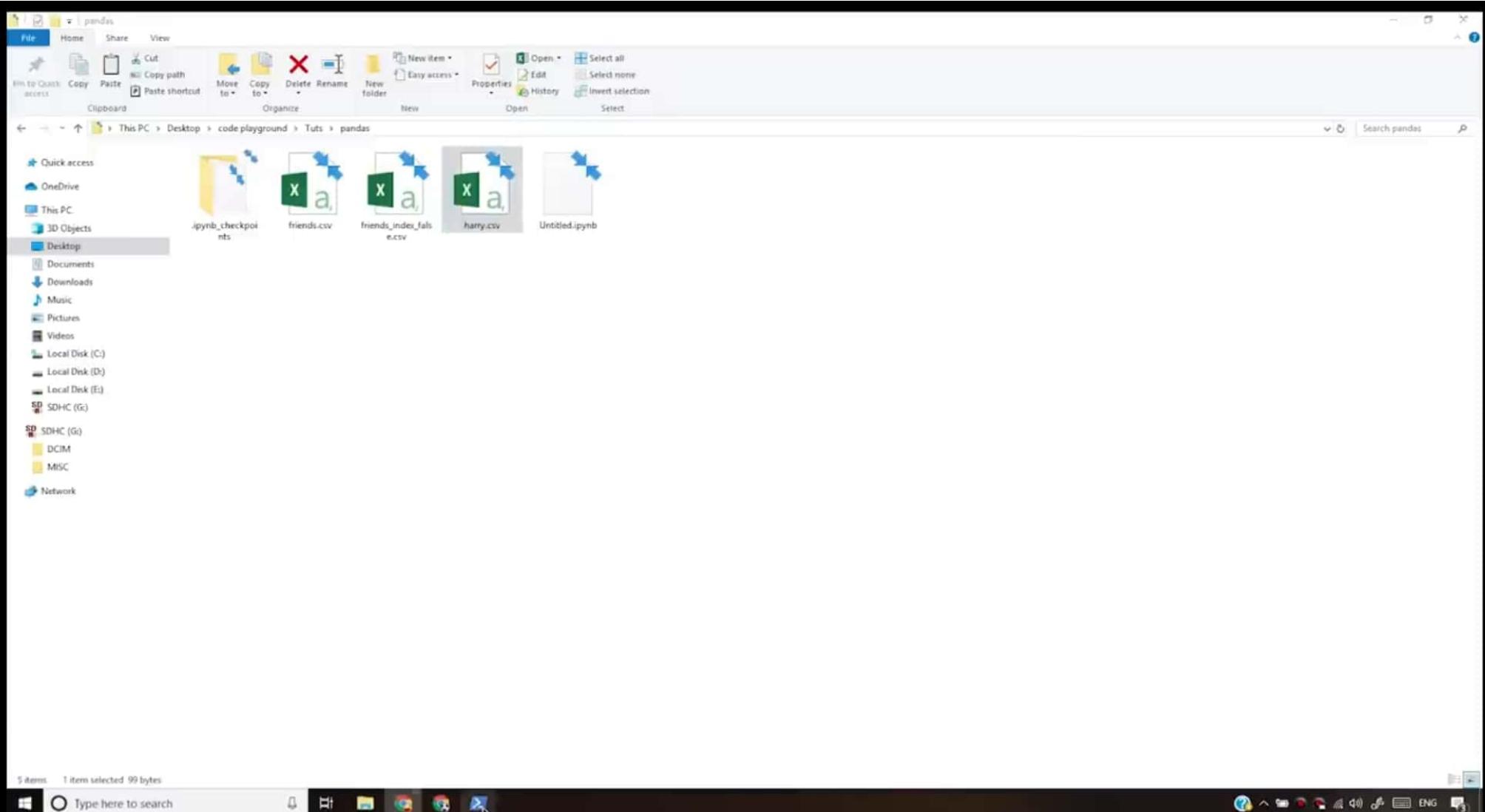
```
In [11]: df.describe()
```

```
Out[11]:
```

	marks
count	4.00000
mean	41.75000
std	34.21866
min	17.00000
25%	22.25000
50%	29.00000
75%	48.50000
max	92.00000

The bottom of the screen shows a Windows taskbar with icons for File Explorer, Google Chrome, and other applications. A search bar and system status indicators are also visible.





The screenshot shows a Jupyter Notebook interface running in a web browser. The title bar indicates the notebook is titled "Untitled" and is currently unsaved. The top menu bar includes File, Edit, View, Insert, Cell, Kernel, Widgets, and Help. On the right side of the header, there are buttons for Python 3, Trusted status, and Logout. Below the menu is a toolbar with various icons for file operations like save, new, copy, paste, and run. The main content area displays a statistical summary of a dataset:

```
std    34.21866
min   17.00000
25%   22.25000
50%   29.00000
75%   48.50000
max   92.00000
```

Below this summary, an input cell shows the command used to load the data:

```
In [13]: harry = pd.read_csv('harry.csv')
```

A second input cell is visible below it, indicated by the placeholder "In []:".

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Logout

File Edit View Insert Cell Kernel Widgets Help Trusted Python 3

Run Cell Code

75% 48.50000

max 92.00000

In [13]: `harry = pd.read_csv('harry.csv')`

In [14]: `harry`

Out[14]:

	Train No	Speed	City
0	12322	34	rampur
1	12534	123	kolkata
2	125654	67	bareilly
3	564523	87	antarctica

In []:

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File Edit View Insert Cell Kernel Widgets Help Trusted Python 3

Out[14]:

	Train No	Speed	City
0	12322	34	rampur
1	12534	123	kolkata
2	125654	67	bareilly
3	564523	87	antarctica

In [15]: harry['Speed']

Out[15]: 0 34
1 123
2 67
3 87
Name: Speed, dtype: int64

In []:

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File Edit View Insert Cell Kernel Widgets Help Trusted Python 3

Out[14]:

	Train No	Speed	City
0	12322	34	rampur
1	12534	123	kolkata
2	125654	67	bareilly
3	564523	87	antarctica

In [16]: harry['Speed'][0] = 345

Out[16]: 34

In []:

This screenshot shows a Jupyter Notebook interface running in a web browser. The title bar indicates it's an 'Untitled' notebook using a 'python3' kernel. The toolbar includes standard options like File, Edit, View, Insert, Cell, Kernel, Widgets, and Help, along with a Python 3 logo and a 'Trusted' button. Below the toolbar is a toolbar with icons for file operations (Save, New, Open, etc.), cell selection, and execution (Run, Cell, Cell Block). The main area displays the output of cell 14, which is a DataFrame with columns 'Train No', 'Speed', and 'City'. The data consists of five rows with indices 0 through 3. In cell 16, the user has run the code 'harry["Speed"][0] = 345', changing the value at index 0 from 34 to 345. The output of this cell is the integer 34. An empty input cell is visible below.

The screenshot shows a Jupyter Notebook interface running in a web browser. The title bar indicates the notebook is titled "Untitled" and is autosaved. The toolbar includes standard file operations like File, Edit, View, Insert, Cell, Kernel, Widgets, and Help, along with a Python 3 kernel icon and a Logout button. Below the toolbar is a toolbar with icons for file operations (Save, New, Copy, Paste, Find, etc.), cell execution (Run, Cell, Cell Block), and code cell selection.

In [17]:

```
harry['Speed'][0] = 50
```

c:\users\haris\appdata\local\programs\python\python37-32\lib\site-packages\ipykernel_launcher.py:1: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame
See the caveats in the documentation: <http://pandas.pydata.org/pandas-docs/stable/indexing.html#indexing-view-versus-copy>
"""Entry point for launching an IPython kernel.

In []:

Home Untitled

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jupyter Untitled (unsaved changes)

Logout

File Edit View Insert Cell Kernel Widgets Help Trusted Python 3

Train No Speed City

	Train No	Speed	City
0	12322	34	rampur
1	12534	123	kolkata
2	125654	67	bareilly
3	564523	87	antarctica

In [17]: `harry['Speed'][0] = 50`

c:\users\haris\appdata\local\programs\python\python37-32\lib\site-packages\ipykernel_launcher.py:1: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame

See the caveats in the documentation: <http://pandas.pydata.org/pandas-docs/stable/indexing.html#indexing-view-versus-copy>
"""Entry point for launching an IPython kernel.

In [19]: `harry`

Type here to search

A screenshot of a Jupyter Notebook interface running in a web browser. The title bar shows "jupyter Untitled (unsaved changes)". The toolbar includes File, Edit, View, Insert, Cell, Kernel, Widgets, Help, Trusted, Python 3, and Logout. Below the toolbar is a toolbar with icons for file operations like save, new, copy, paste, and run. A message box displays a warning about pandas indexing best practices and the entry point for launching an IPython kernel.

In [19]: harry

Out[19]:

	Train No	Speed	City
0	12322	50	rampur
1	12534	123	kolkata
2	125654	67	bareilly
3	564523	87	antarctica

In []: harry

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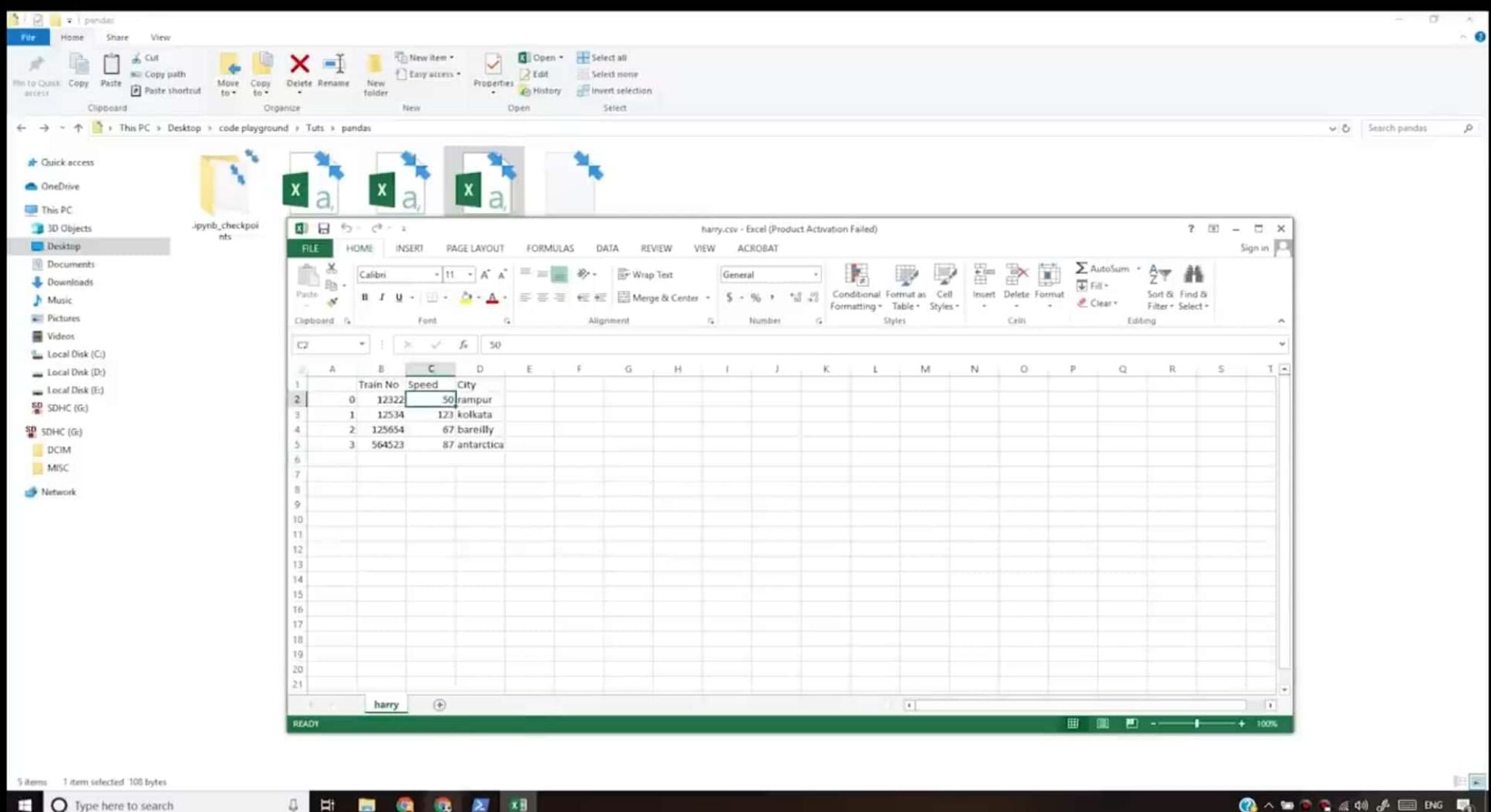
Out[19]:

	Train No	Speed	City
0	12322	50	rampur
1	12534	123	kolkata
2	125654	67	bareilly
3	564523	87	antarctica

In [20]: `harry.to_csv('harry.csv')`

In []:

This screenshot shows a Jupyter Notebook interface running in a web browser. The title bar indicates the notebook is titled 'Untitled' and has unsaved changes. The toolbar includes standard options like File, Edit, View, Insert, Cell, Kernel, Widgets, and Help, along with a Python 3 kernel selector. Below the toolbar is a toolbar with icons for file operations (Save, New, Open, etc.), cell selection (Run, Cell, Cell Block), and code execution (Cell, Run Cell). The main area displays the output of cell 19, which is a DataFrame with columns 'Train No', 'Speed', and 'City'. The data consists of four rows with indices 0, 1, 2, and 3. The output is styled with a light gray background and white text. Below the output is the code from cell 20, which uses the 'to_csv' method on a variable named 'harry' to save the data to a CSV file. A code input cell is also visible below it. The bottom of the screen shows the Windows taskbar with various pinned icons and a search bar.



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jupyter Untitled (unsaved changes)

Logout

File Edit View Insert Cell Kernel Widgets Help Trusted Python 3

Code

2	125654	67	bareilly
3	564523	87	antarctica

In [20]: `harry.to_csv('harry.csv')`

In [23]: `harry.index = ['first', 'second', 'third', 'fourth']`

In [24]: `harry`

Out[24]:

	Train No	Speed	City
first	12322	50	rampur
second	12534	123	kolkata
third	125654	67	bareilly
fourth	564523	87	antarctica

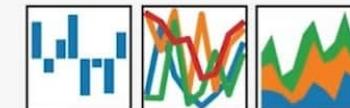
WHAT IS PANDAS



- Pandas is an open source data analysis library written in python
- It leverages the power and speed of numpy to make data analysis and preprocessing easy for data scientists
- It provides rich and highly robust data operations

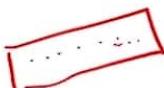
pandas

$$y_{it} = \beta' x_{it} + \mu_i + \epsilon_{it}$$



WHAT IS PANDAS

numpy



Excel

python

[list
Dict.
tuple]

- ✓ Pandas is an open source data analysis library written in python
- ✓ It leverages the power and speed of numpy to make data analysis and preprocessing easy for data scientists
- ✓ It provides rich and highly robust data operations

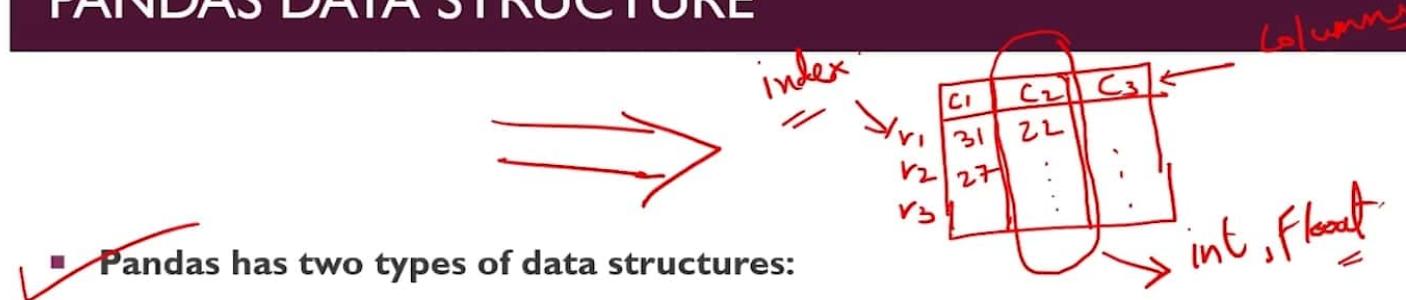
+

pandas

$$y_{it} = \beta' x_{it} + \mu_i + \epsilon_{it}$$



PANDAS DATA STRUCTURE



- ✓ Pandas has two types of data structures:
 - a) Series – It's a one dimensional array with indexes, it stores a single column or row of data in a Dataframe
 - b) Dataframe – It's a tabular spreadsheet like structure representing rows each of which contains one or multiple columns
- ✓ A one-dimensional array(labeled) capable of holding any type of data– Series
- ✓ A two-dimensional data (labeled) structure with columns of potentially different types of data - DataFrame

JUPYTER NOTEBOOK

- ✓ The **Jupyter Notebook** is an open-source web application that allows you to create and share documents that contain live code, equations, visualizations and narrative text.
- ✓ The Notebook has support for over 40 programming languages, including Python, R, Julia, and Scala.
- ✓ Notebooks can be shared with others using email, Dropbox, GitHub and the [Jupyter Notebook Viewer](#).
- ✓ Your code can produce rich, interactive output: HTML, images, videos, LaTeX, and custom MIME types.
- ✓ Lets go to our notebook and write some code



The screenshot shows a Jupyter Notebook interface running in a browser window. The title bar indicates the notebook is titled "Untitled" and is currently unsaved. The toolbar includes standard file operations like Save, New, and Delete, along with Run, Cell, Kernel, Widgets, and Help buttons. A Python 3 kernel icon is present, and the status bar shows the kernel name as "python3".

The main content area displays a DataFrame:

```
first      0    12322     50   rampur
second     1    12534     123  kolkata
third      2    125654    67   bareilly
fourth     3    564523    87 antarctica
```

Below the DataFrame, two code cells are shown:

In [17]:

```
ser = pd.Series(np.random.rand)
```

In [18]:

```
ser
```

Out[18]:

```
0    <built-in method rand of mtrand.RandomState ob...
      dtype: object
```

The Windows taskbar at the bottom shows various pinned icons, including File Explorer, Google Chrome, and Microsoft Edge.

A screenshot of a Jupyter Notebook interface running in a web browser. The title bar shows "jupyter Untitled (unsaved changes)". The toolbar includes standard file operations like Save, New, and Delete, along with Run, Cell, Kernel, Widgets, and Help buttons. A Python 3 kernel icon indicates the current kernel. The main content area displays a list of floating-point numbers:

```
24    0.455545
25    0.209477
26    0.007639
27    0.570959
28    0.178350
29    0.167277
30    0.796491
31    0.096979
32    0.782817
33    0.987843
dtype: float64
```

The input cell below the output is labeled "In []:".

The screenshot shows a Jupyter Notebook interface running on a Windows operating system. The browser tab indicates the URL is `localhost:8888/notebooks/Untitled.ipynb?kernel_name=python3`. The notebook title is "Untitled (unsaved changes)". The toolbar includes File, Edit, View, Insert, Cell, Kernel, Widgets, Help, Trusted, Python 3, and Logout. Below the toolbar is a toolbar with icons for file operations like save, new, and run, as well as cell selection and execution controls.

In [16]: harry

Out[16]:

	Unnamed: 0	Train No	Speed	City
first	0	12322	50	rampur
second	1	12534	123	kolkata
third	2	125654	67	bareilly
fourth	3	564523	87	antarctica

In [19]: ser = pd.Series(np.random.rand(34))

In [20]: type()

Out[20]:

0	0.056661
1	0.918766
2	0.494444
3	0.615236

Windows taskbar at the bottom: Type here to search, File Explorer, Google Chrome, Microsoft Edge, and File Explorer icons.

The screenshot shows a Jupyter Notebook interface running in a web browser window. The title bar indicates the notebook is titled "Untitled" and is currently "unsaved changes". The toolbar includes standard file operations like Save, New, and Delete, along with Run, Cell, Kernel, Widgets, and Help buttons. A Python logo icon and a Logout button are also present.

The main area displays a DataFrame with four rows:

	first	0	12322	50	rampur
second	1	12534	123	kolkata	
third	2	125654	67	bareilly	
fourth	3	564523	87	antarctica	

Below the DataFrame, there are two previous code cells and their outputs:

```
In [19]: ser = pd.Series(np.random.rand(34))
```

```
In [21]: type(ser)
```

```
Out[21]: pandas.core.series.Series
```

A new code cell is currently being edited, indicated by a green border:

```
In [ ]: newdf = pd.DataFrame(np.random.rand(334,5))
```

The screenshot shows a Jupyter Notebook interface running in a web browser window. The title bar indicates the notebook is titled "Untitled" and is currently unsaved. The toolbar includes standard file operations like Save, New, and Delete, along with Run, Cell, Kernel, Widgets, and Help buttons. A Python 3 kernel icon is present, and the status bar shows the notebook is "Trusted".

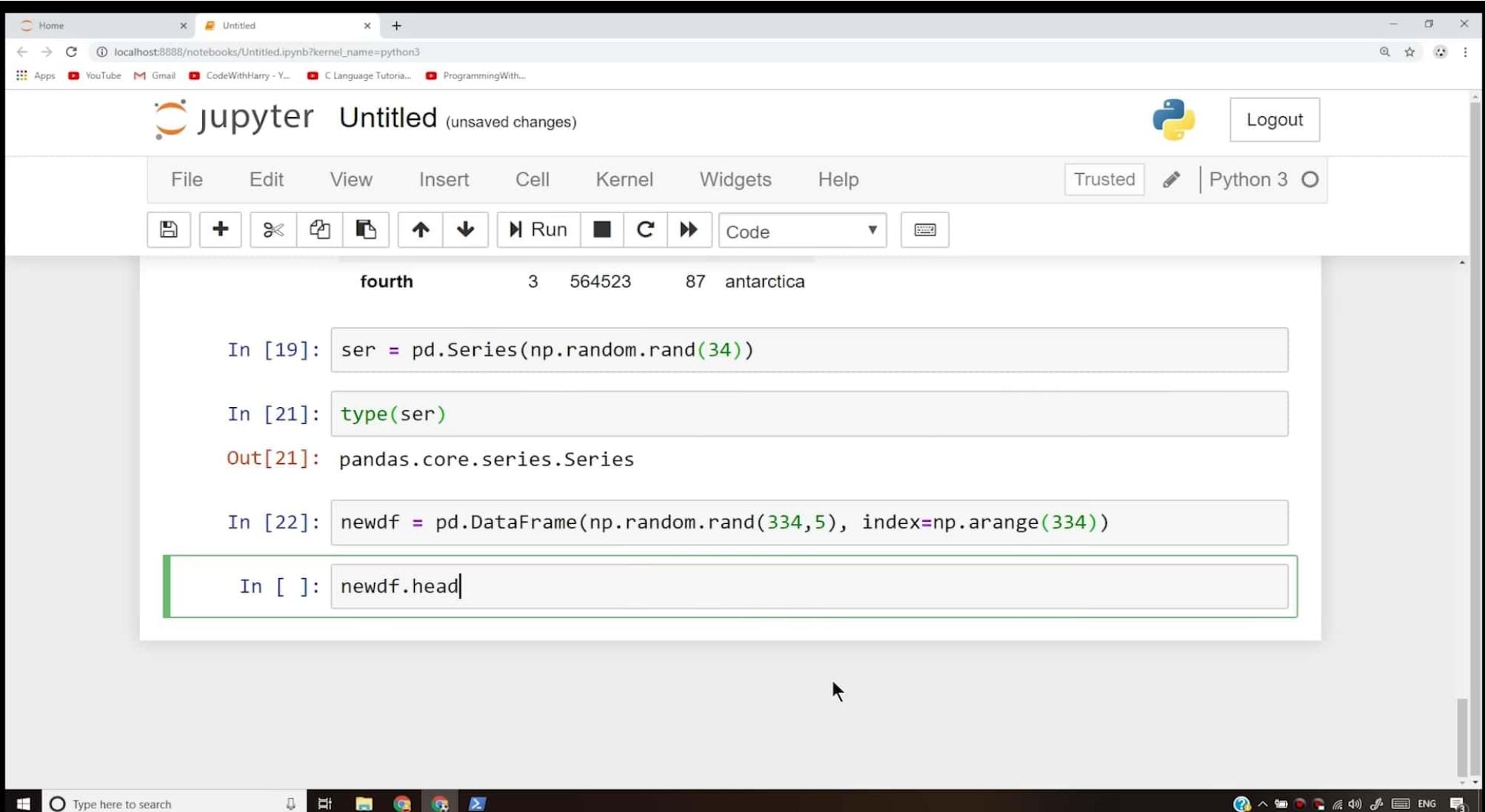
The main area displays a DataFrame object:

```
first      0    12322     50   rampur
second     1    12534     123  kolkata
third      2    125654     67  bareilly
fourth     3    564523     87  antarctica
```

Below the DataFrame, several code cells are shown:

- In [19]: `ser = pd.Series(np.random.rand(34))`
- In [21]: `type(ser)`
- Out[21]: `pandas.core.series.Series`
- In []: `newdf = pd.DataFrame(np.random.rand(334,5), index=np.arange(3))`

The bottom of the screen shows the Windows taskbar with the Start button, a search bar, and various pinned application icons.



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jupyter Untitled (unsaved changes)

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In [19]: ser = pd.Series(np.random.rand(34))

In [21]: type(ser)

Out[21]: pandas.core.series.Series

In [22]: newdf = pd.DataFrame(np.random.rand(334,5), index=np.arange(334))

In [23]: newdf.head()

Out[23]:

	0	1	2	3	4
0	0.787233	0.403043	0.786200	0.505931	0.4339403
1	0.380081	0.029315	0.020479	0.253318	0.605891
2	0.126679	0.341571	0.928397	0.526483	0.147200
3	0.513701	0.358099	0.741483	0.828668	0.010595

The screenshot shows a Jupyter Notebook interface running in a web browser window. The title bar indicates the notebook is titled "Untitled" and is located at "localhost:8888/notebooks/Untitled.ipynb?kernel_name=python3". The menu bar includes File, Edit, View, Insert, Cell, Kernel, Widgets, and Help. A toolbar below the menu bar contains icons for file operations like save, new, and run, along with a "Code" dropdown and keyboard shortcut keys. The main workspace displays an "In [23]" cell containing the Python command `newdf.head()`. Below it, the "Out[23]" cell displays the resulting DataFrame:

	0	1	2	3	4
0	0.787233	0.403043	0.786200	0.505931	0.439403
1	0.380081	0.029315	0.020479	0.253318	0.605891
2	0.126679	0.34151	0.928397	0.526483	0.147200
3	0.513701	0.358099	0.741483	0.828668	0.010595
4	0.803533	0.035013	0.330713	0.057722	0.495489

The bottom of the screen shows a Windows taskbar with various pinned icons and a search bar.

The screenshot shows a Jupyter Notebook interface running in a web browser. The title bar indicates the notebook is titled "Untitled" and is currently unsaved. The menu bar includes File, Edit, View, Insert, Cell, Kernel, Widgets, and Help. A toolbar below the menu contains icons for file operations like Open, Save, and Run, along with a "Code" dropdown and a keyboard icon.

In [22]:

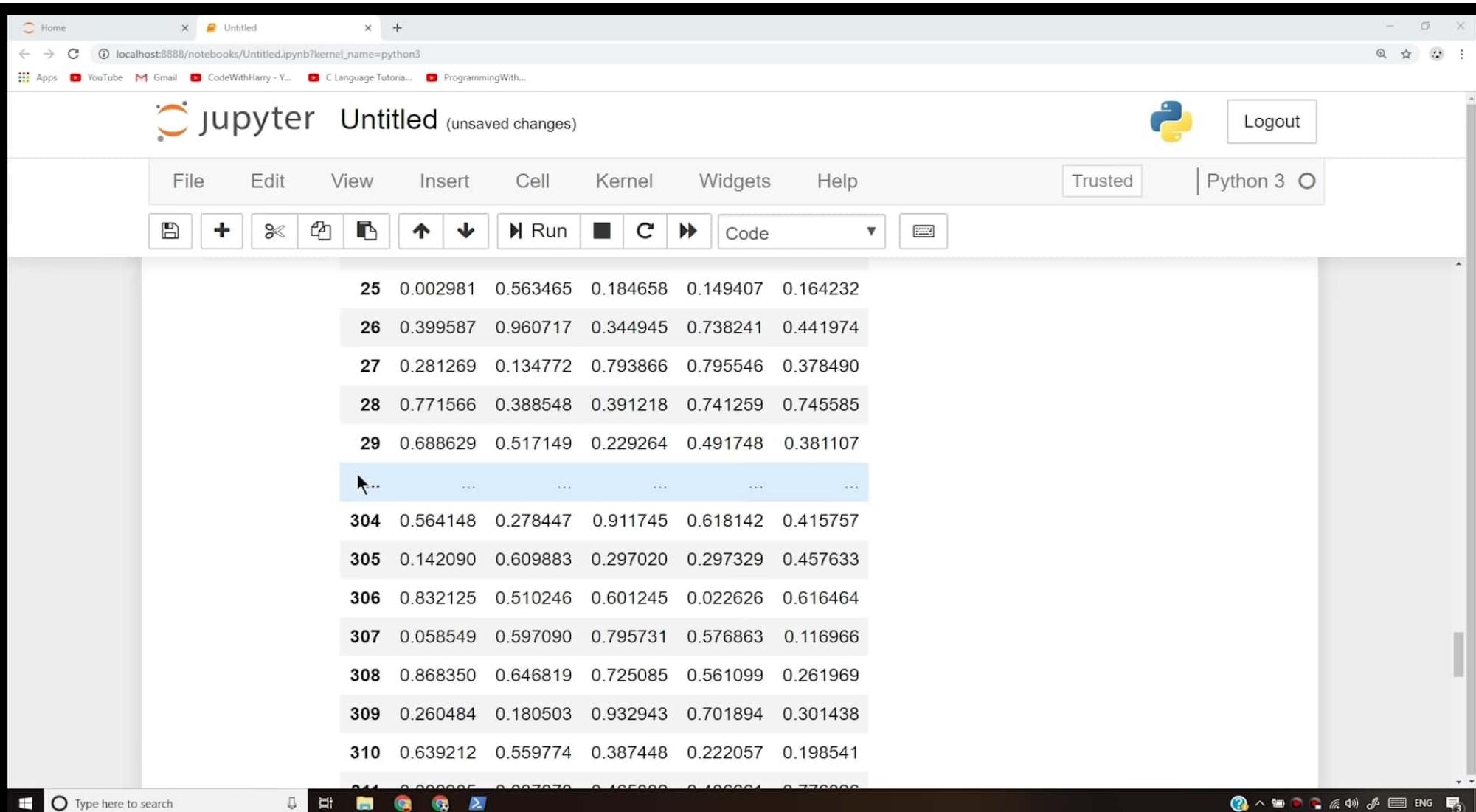
```
newdf = pd.DataFrame(np.random.rand(334,5), index=np.arange(334))
```

In [24]:

```
newdf
```

Out[24]:

	0	1	2	3	4
0	0.787233	0.403043	0.786200	0.505931	0.439403
1	0.380081	0.029315	0.020479	0.253318	0.605891
2	0.126679	0.341571	0.928397	0.526483	0.147200
3	0.513701	0.358099	0.741483	0.828668	0.010595
4	0.803533	0.035013	0.330713	0.057722	0.495489
5	0.736996	0.290971	0.556454	0.038279	0.981708
6	0.268910	0.448890	0.601703	0.585790	0.148410
7	0.999783	0.732357	0.076276	0.876269	0.044649
8	0.258721	0.585082	0.764742	0.862208	0.331231
9	0.239536	0.779391	0.778879	0.888739	0.612924



The screenshot shows a Jupyter Notebook interface running in a web browser window. The title bar indicates the notebook is titled "Untitled" and is currently unsaved. The browser's address bar shows the URL `localhost:8888/notebooks/Untitled.ipynb?kernel_name=python3`. The Jupyter logo is visible in the top right corner, along with a "Logout" button. The menu bar includes File, Edit, View, Insert, Cell, Kernel, Widgets, and Help. A toolbar below the menu bar contains icons for file operations like save, new, and run, as well as a "Code" dropdown and a keyboard icon. The main workspace displays two code cells and their outputs:

```
In [21]: type(ser)
Out[21]: pandas.core.series.Series
```

```
In [22]: newdf = pd.DataFrame(np.random.rand(334,5), index=np.arange(334))
Out[22]:
```

```
In [25]: type(newdf)
Out[25]: pandas.core.frame.DataFrame
```

```
In [ ]:
```

The bottom of the screen shows the Windows taskbar with the Start button, a search bar, and various pinned application icons.

A screenshot of a Jupyter Notebook interface running in a web browser. The title bar shows "Untitled" and the URL "localhost:8888/notebooks/Untitled.ipynb?kernel_name=python3". The toolbar includes standard file operations (File, Edit, View, Insert, Cell, Kernel, Widgets, Help), a Trusted status indicator, and a Python 3 kernel selection. Below the toolbar is a toolbar with icons for file operations like save, new, and run, along with code folding and cell execution controls. The main content area displays a statistical summary table:

	mean	0.490911	0.512448	0.501784	0.480501	0.470628
std	0.292406	0.281117	0.286704	0.296895	0.279314	
min	0.002182	0.004690	0.001822	0.003238	0.002314	
25%	0.239134	0.291302	0.251738	0.224809	0.232284	
50%	0.500495	0.510000	0.515341	0.469571	0.451793	
75%	0.744794	0.746105	0.757930	0.737629	0.711770	
max	0.999783	0.996083	0.996293	0.999777	0.992422	

The input cell below the table is labeled "In []:".

The screenshot shows a Jupyter Notebook interface running in a browser window. The title bar indicates the notebook is titled "Untitled" and is currently unsaved. The toolbar includes standard file operations like Save, New, and Run, along with a Python 3 kernel selection. The main area displays two code cells and their outputs.

In [25]: `type(newdf)`

Out[25]: `pandas.core.frame.DataFrame`

In [26]: `newdf.describe()`

Out[26]:

	0	1	2	3	4
count	334.000000	334.000000	334.000000	334.000000	334.000000
mean	0.490911	0.512448	0.501784	0.480501	0.470628
std	0.292406	0.281117	0.286704	0.296895	0.279314
min	0.002182	0.004690	0.001822	0.003238	0.002314
25%	0.239134	0.291302	0.251738	0.224809	0.232284
50%	0.500495	0.510000	0.515341	0.469571	0.451793
75%	0.744794	0.746105	0.757930	0.737629	0.711770
max	0.999783	0.996083	0.996293	0.999777	0.992422

The screenshot shows a Jupyter Notebook interface running in a browser window. The title bar indicates the notebook is titled "Untitled" and is currently unsaved. The toolbar includes standard file operations like Save, New, and Delete, along with Run, Kernel, Widgets, and Help buttons. A Python 3 kernel icon is present, and the status bar shows the notebook is "Trusted".

The main content area displays a data frame summary:

	std	0.292406	0.281117	0.286704	0.296895	0.279314
min	0.002182	0.004690	0.001822	0.003238	0.002314	
25%	0.239134	0.291302	0.251738	0.224809	0.232284	
50%	0.500495	0.510000	0.515341	0.469571	0.451793	
75%	0.744794	0.746105	0.757930	0.737629	0.711770	
max	0.999783	0.996083	0.996293	0.999777	0.992422	

Below this, an output cell shows the command "newdf.dtypes" and its result:

```
In [27]: newdf.dtypes
Out[27]: 0    float64
          1    float64
          2    float64
          3    float64
          4    float64
         dtype: object
```

A cursor is visible over the "In []:" input field at the bottom of the screen.

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jupyter Untitled (unsaved changes)

Logout

File Edit View Insert Cell Kernel Widgets Help Trusted Python 3

In [26]: newdf.describe()

Out[26]:

	0	1	2	3	4
count	334.000000	334.000000	334.000000	334.000000	334.000000
mean	0.490911	0.512448	0.501784	0.480501	0.470628
std	0.292406	0.281117	0.286704	0.296895	0.279314
min	0.002182	0.004690	0.001822	0.003238	0.002314
25%	0.239134	0.291302	0.251738	0.224809	0.232284
50%	0.500495	0.510000	0.515341	0.469571	0.451793
75%	0.744794	0.746105	0.757930	0.737629	0.711770
max	0.999783	0.996083	0.996293	0.999777	0.992422

In [27]: newdf.dtypes

Out[27]: 0 float64
1 float64

Type here to search

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jupyter Untitled (unsaved changes)

Logout

File Edit View Insert Cell Kernel Widgets Help Trusted Python 3

In [28]: `type(newdf)
newdf.head()`

Out[28]:

	0	1	2	3	4
0	0.787233	0.403043	0.786200	0.505931	0.439403
1	0.380081	0.029315	0.020479	0.253318	0.605891
2	0.126679	0.341571	0.928397	0.526483	0.147200
3	0.513701	0.358099	0.741483	0.828668	0.010595
4	0.803533	0.035013	0.330713	0.057722	0.495489

In [26]: `newdf.describe()`

Out[26]:

	0	1	2	3	4
count	334.000000	334.000000	334.000000	334.000000	334.000000
mean	0.400011	0.512448	0.501794	0.490501	0.470628

Type here to search

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jupyter Untitled (unsaved changes)

Logout

File Edit View Insert Cell Kernel Widgets Help Trusted Python 3

In [26]: newdf.describe()

Out[26]:

	0	1	2	3	4
count	334.000000	334.000000	334.000000	334.000000	334.000000
mean	0.490911	0.512448	AUTO	0.480501	0.470628
std	0.292406	0.281117	0.286704	0.296895	0.279314
min	0.002182	0.004690	0.001822	0.003238	0.002314
25%	0.239134	0.291302	0.251738	0.224809	0.232284
50%	0.500495	0.510000	0.515341	0.469571	0.451793
75%	0.744794	0.746105	0.757930	0.737629	0.711770
max	0.999783	0.996083	0.996293	0.999777	0.992422

In [27]: newdf.dtypes

Out[27]: 0 float64
1 float64

Type here to search

The screenshot shows a Jupyter Notebook interface running in a browser window. The title bar indicates the notebook is titled "Untitled" and is currently unsaved. The menu bar includes File, Edit, View, Insert, Cell, Kernel, Widgets, and Help. A toolbar below the menu contains icons for file operations like save, new, and run, along with a "Code" dropdown and a keyboard icon. The main area displays two code cells:

```
In [27]: newdf.dtypes
```

```
Out[27]: 0    float64  
1    float64  
2    float64  
3    float64  
4    float64  
dtype: object
```

```
In [29]: newdf[0][0] = "harry"
```

```
In [ ]: nwe
```

The last cell, In []:, has a green border around its input field, and the text "nwe" is being typed into it. The status bar at the bottom shows the Windows taskbar with various pinned icons and a search bar.

The screenshot shows a Jupyter Notebook interface running in a web browser window. The title bar indicates the notebook is titled "Untitled" and is currently unsaved. The menu bar includes File, Edit, View, Insert, Cell, Kernel, Widgets, and Help. A toolbar below the menu bar contains icons for file operations like save, new, and copy, along with run, cell selection, and code execution buttons. The main area displays two code cells and their outputs:

```
In [29]: newdf[0][0] = "harry"
```

```
In [30]: newdf.dtypes
```

```
Out[30]: 0      object  
1      float64  
2      float64  
3      float64  
4      float64  
dtype: object
```

The bottom of the screen shows a Windows taskbar with various pinned icons and a search bar.

A screenshot of a Jupyter Notebook interface running in a web browser. The title bar shows "jupyter Untitled (unsaved changes)". The menu bar includes File, Edit, View, Insert, Cell, Kernel, Widgets, and Help. The toolbar below has icons for file operations like save, new, and run, along with a "Code" dropdown. A Python 3 kernel icon is also present. The main area displays an "Out[31]:" cell containing a table with 5 rows and 6 columns. The first row is highlighted in blue. The table data is as follows:

	0	1	2	3	4
0	harry	0.403043	0.786200	0.505931	0.439403
1	0.380081	0.029315	0.020479	0.253318	0.605891
2	0.126679	0.341571	0.928397	0.526483	0.147200
3	0.513701	0.358099	0.741483	0.828668	0.010595
4	0.803533	0.035013	0.330713	0.057722	0.495489

The "In []:" cell is empty, indicated by a green border.

The screenshot shows a Jupyter Notebook interface running in a web browser window. The title bar indicates the notebook is titled "Untitled" and is currently unsaved. The toolbar includes standard file operations like Save, New, and Open, along with Run, Cell, Kernel, Widgets, and Help buttons. The Python 3 kernel is selected.

The main content area displays a DataFrame named "newdf". The first five rows of the DataFrame are shown:

		harry	0.403043	0.786200	0.505931	0.439403
0	harry	0.403043	0.786200	0.505931	0.439403	
1	0.380081	0.029315	0.020479	0.253318	0.605891	
2	0.126679	0.341571	0.928397	0.526483	0.147200	
3	0.513701	0.358099	0.741483	0.828668	0.010595	
4	0.803533	0.035013	0.330713	0.057722	0.495489	

In the code editor cell, the command `newdf.index` is run, and the output is an Int64Index object containing integers from 0 to 333, with a length of 334.

```
In [32]: newdf.index
Out[32]: Int64Index([ 0,  1,  2,  3,  4,  5,  6,  7,  8,  9,
                      ...
                     324, 325, 326, 327, 328, 329, 330, 331, 332, 333],
                     dtype='int64', length=334)
```

A new input cell is ready for the next command, indicated by the placeholder "In []:".

The screenshot shows a Jupyter Notebook interface running in a web browser window titled "Untitled". The browser's address bar indicates the URL is `localhost:8888/notebooks/Untitled.ipynb?kernel_name=python3`. The notebook has tabs for "Home" and "Untitled". The top menu bar includes "File", "Edit", "View", "Insert", "Cell", "Kernel", "Widgets", and "Help". On the right side of the header are "Logout" and kernel selection buttons for "Python 3". Below the menu is a toolbar with icons for file operations like save, new, copy, paste, and run. The main workspace displays two code cells and their outputs:

```
4 0.803533 0.035013 0.330713 0.057722 0.495489

In [32]: newdf.index

Out[32]: Int64Index([ 0, 1, 2, 3, 4, 5, 6, 7, 8, 9,
...
324, 325, 326, 327, 328, 329, 330, 331, 332, 333],
dtype='int64', length=334)

In [33]: newdf.columns

Out[33]: RangeIndex(start=0, stop=5, step=1)

In [ ]:
```

The screenshot shows a Jupyter Notebook interface running in a web browser window. The title bar indicates the notebook is titled "Untitled" and is currently unsaved. The toolbar includes standard file operations like Open, Save, and New, along with Run, Cell, Kernel, Widgets, and Help buttons. A Python 3 kernel icon is present, and the status bar shows the notebook is "Trusted".

In [32]: newdf.index

```
Out[32]: Int64Index([ 0,  1,  2,  3,  4,  5,  6,  7,  8,  9,
... 324, 325, 326, 327, 328, 329, 330, 331, 332, 333],
dtype='int64', length=334)
```

In [33]: newdf.columns

```
Out[33]: RangeIndex(start=0, stop=5, step=1)
```

In [34]: newdf.to_numpy()

```
Out[34]: array([[ 'harry',  0.4030426468162003,  0.7861995143514873,
   0.5059307875860506,  0.439402751996007],
   [0.38008147202504083,  0.0293146378599205,  0.02047946598151984,
   0.25331793933803326,  0.6058906421799364],
   [0.12667944371991147,  0.3415711317103687,  0.9283974985306795,
   0.5264829528875932,  0.14720017874239066],
   ...,
   [0.41478191078708404,  0.04403781727095468,  0.27313946974470316,
   0.7989781170850595,  0.57051805090396],
```

The screenshot shows a Jupyter Notebook interface running in a web browser window. The title bar indicates the notebook is titled "Untitled" and is currently unsaved. The toolbar includes standard file operations like Save, New, and Open, along with Run, Cell, Kernel, Widgets, Help, and a Trusted status indicator. The Python 3 kernel is selected.

In [34]: `newdf.to_numpy()`

Out[34]:

```
array([[ 'harry',  0.4030426468162003,  0.7861995143514873,
       0.5059307875860506,  0.439402751996007],
       [0.38008147202504083,  0.0293146378599205,  0.02047946598151984,
       0.25331793933803326,  0.6058906421799364],
       [0.12667944371991147,  0.3415711317103687,  0.9283974985306795,
       0.5264829528875932,  0.14720017874239066],
       ...,
       [0.41478191078708404,  0.04403781727095468,  0.27313946974470316,
       0.7989781170850595,  0.57051805090396],
       [0.4794736566321005,  0.17552574958520284,  0.3419247427767318,
       0.6466392094784986,  0.5798503298271867],
       [0.6359961620279082,  0.9410986015157621,  0.12375009601396247,
       0.4457542032329025,  0.8508466647587516]], dtype=object)
```

In []:

The screenshot shows a Jupyter Notebook interface running in a web browser window. The title bar indicates the notebook is titled "Untitled" and is currently unsaved. The toolbar includes standard file operations like Save, New, and Open, along with a Run button, a Cell type selector (set to Code), and a Kernel dropdown (set to Python 3). The menu bar offers options like File, Edit, View, Insert, Cell, Kernel, Widgets, and Help. A status bar at the bottom shows the Windows taskbar with icons for File Explorer, Google Chrome, and other applications.

In [36]:

```
newdf[0][0] = 0.3
```

c:\users\haris\appdata\local\programs\python\python37-32\lib\site-packages\ipykernel_launcher.py:1: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame

See the caveats in the documentation: <http://pandas.pydata.org/pandas-docs/stable/indexing.html#indexing-view-versus-copy>
"""\nEntry point for launching an IPython kernel.

In [37]:

```
newdf.head()
```

Out[37]:

	0	1	2	3	4
0	0.3	0.403043	0.786200	0.505931	0.439403
1	0.380081	0.029315	0.020479	0.253318	0.605891
2	0.126679	0.341571	0.928397	0.526483	0.147200
3	0.513701	0.358099	0.741483	0.828668	0.010595
4	0.803533	0.035013	0.330713	0.057722	0.495489

The screenshot shows a Jupyter Notebook running in a web browser window. The title bar indicates the notebook is titled "Untitled" and is currently unsaved. The toolbar includes standard file operations like Save, New, and Delete, along with Run, Cell, Kernel, Widgets, and Help buttons. A Python 3 kernel icon and a "Logout" button are also present.

In the main area, a cell has just been run, displaying the output:

```
0.4457542032329025, 0.8508466647587516]]], dtype=object)
```

The next cell, labeled "In [36]:", contains the following code:

```
newdf[0][0] = 0.3
```

Execution of this cell resulted in a warning message:

```
c:\users\haris\appdata\local\programs\python\python37-32\lib\site-packages\ipykernel_launcher.py:1: SettingWithCopyWarning:  
A value is trying to be set on a copy of a slice from a DataFrame  
  
See the caveats in the documentation: http://pandas.pydata.org/pandas-docs/stable/indexing.html#indexing-view-versus-copy  
"""Entry point for launching an IPython kernel.
```

The subsequent cell, "In []:", contains the command:

```
newdf.head()
```

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jupyter Untitled (unsaved changes)

Logout

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Run Code

	0	1	2	3	4
0	0.3	0.403043	0.786200	0.505931	0.439403
1	0.380081	0.029315	0.020479	0.253318	0.605891
2	0.126679	0.341571	0.928397	0.526483	0.147200
3	0.513701	0.358099	0.741483	0.828668	0.010595
4	0.803533	0.035013	0.330713	0.057722	0.495489

In [39]: newdf.T

Out[39]:

	0	1	2	3	4	5	6	7	8
0	0.3	0.380081	0.126679	0.513701	0.803533	0.736996	0.26891	0.999783	0.258721
1	0.403043	0.0293146	0.341571	0.358099	0.0350126	0.290971	0.44889	0.732357	0.585082
2	0.7862	0.0204795	0.928397	0.741483	0.330713	0.556454	0.601703	0.0762764	0.764742
3	0.505931	0.253318	0.526483	0.828668	0.0577218	0.0382787	0.58579	0.876269	0.862208
4	0.439403	0.605891	0.1472	0.0105949	0.495489	0.981708	0.14841	0.0446495	0.331231

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jupyter Untitled (unsaved changes) Logout

File Edit View Insert Cell Kernel Widgets Help Trusted Python 3

Run Code

2	0.126679	0.341571	0.928397	0.526483	0.147200
3	0.513701	0.358099	0.741483	0.828668	0.010595
4	0.803533	0.035013	0.330713	0.057722	0.495489

In [39]: newdf.T

Out[39]:

	0	1	2	3	4	5	6	7	8
0	0.3	0.380081	0.126679	0.513701	0.803533	0.736996	0.26891	0.999783	0.258721
1	0.403043	0.0293146	0.341571	0.358099	0.0350126	0.290971	0.44889	0.732357	0.585082
2	0.7862	0.0204795	0.928397	0.741483	0.330713	0.556454	0.601703	0.0762764	0.764742
3	0.505931	0.253318	0.526483	0.828668	0.0577218	0.0382787	0.58579	0.876269	0.862208
4	0.439403	0.605891	0.1472	0.0105949	0.495489	0.981708	0.14841	0.0446495	0.331231

5 rows × 334 columns

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A screenshot of a Jupyter Notebook interface running in a web browser. The title bar shows "jupyter Untitled (unsaved changes)". The toolbar includes standard file operations like Save, New, and Open, along with Run, Cell, Kernel, Widgets, Help, Trusted status (which is off), and Python 3 kernel selection. Below the toolbar, there's a row of icons for file operations. The main content area displays the result of a code cell execution:

```
In [41]: newdf.head()
```

Out[41]:

	0	1	2	3	4
0	0.3	0.403043	0.786200	0.505931	0.439403
1	0.380081	0.029315	0.020479	0.253318	0.605891
2	0.126679	0.341571	0.928397	0.526483	0.147200
3	0.513701	0.358099	0.741483	0.828668	0.010595
4	0.803533	0.035013	0.330713	0.057722	0.495489

The bottom of the window shows the Windows taskbar with the Start button, a search bar, and pinned application icons for File Explorer, Google Chrome, and Microsoft Edge.

The screenshot shows a Jupyter Notebook interface running in a web browser window. The title bar indicates the notebook is titled "Untitled" and is currently unsaved. The toolbar includes standard file operations like New, Open, Save, and Run, along with a Python 3 kernel selection. The main content area displays a DataFrame named "newdf".

In [43]: newdf.sort_index(axis=0)

Out[43]:

	0	1	2	3	4
0	0.3	0.403043	0.786200	0.505931	0.439403
1	0.380081	0.029315	0.020479	0.253318	0.605891
2	0.126679	0.341571	0.928397	0.526483	0.147200
3	0.513701	0.358099	0.741483	0.828668	0.010595
4	0.803533	0.035013	0.330713	0.057722	0.495489

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jupyter Untitled (unsaved changes)

Logout

File Edit View Insert Cell Kernel Widgets Help Trusted Python 3

Run Cell Code

	0	1	2	3	4
0	0.3	0.403043	0.786200	0.505931	0.439403
1	0.380081	0.029315	0.020479	0.253318	0.605891
2	0.126679	0.341571	0.928397	0.526483	0.147200
3	0.513701	0.358099	0.741483	AUTO	0.11505
4	0.803533	0.035013	0.330713	-0.057722	0.495489

In [42]: newdf.sort_index(axis=0, ascending=False)

Out[42]:

	0	1	2	3	4
333	0.635996	0.941099	0.123750	0.445754	0.850847
332	0.479474	0.175526	0.341925	0.646639	0.579850
331	0.414782	0.044038	0.273139	0.798978	0.570518
330	0.375563	0.319328	0.562131	0.966399	0.785067
329	0.217353	0.874229	0.849358	0.029952	0.827375

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jupyter Untitled (unsaved changes)

Logout

File Edit View Insert Cell Kernel Widgets Help Trusted Python 3

Run Cell Code

	0	1	2	3	4
0	0.3	0.403043	0.786200	0.505931	0.439403
1	0.380081	0.029315	0.020479	0.253318	0.605891
2	0.126679	0.341571	0.928397	0.526483	0.147200
3	0.513701	0.358099	0.741483	0.828668	0.010595
4	0.803533	0.035013	0.330713	0.057722	0.495489

In [43]: newdf.sort_index(axis=)

Out[43]:

	0	1	2	3	4
0	0.3	0.403043	0.786200	0.505931	0.439403
1	0.380081	0.029315	0.020479	0.253318	0.605891
2	0.126679	0.341571	0.928397	0.526483	0.147200
3	0.513701	0.358099	0.741483	0.828668	0.010595
4	0.803533	0.035013	0.330713	0.057722	0.495489

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jupyter Untitled (unsaved changes)

Logout

File Edit View Insert Cell Kernel Widgets Help Trusted Python 3

Run

	0	1	2	3	4
0	0.3	0.403043	0.786200	0.505931	0.439403
1	0.380081	0.029315	0.020479	0.253318	0.605891
2	0.126679	0.341571	0.928397	0.526483	0.147200
3	0.513701	0.358099	0.741483	0.828668	0.010595
4	0.803533	0.035013	0.330713	0.057722	0.495489

In [44]: newdf.sort_index(axis=1, ascending=False)

Out[44]:

	4	3	2	1	0
0	0.439403	0.505931	0.786200	0.403043	0.3
1	0.605891	0.253318	0.020479	0.029315	0.380081
2	0.147200	0.526483	0.928397	0.341571	0.126679
3	0.010595	0.828668	0.741483	0.358099	0.513701
4	0.495489	0.057722	0.330713	0.035013	0.803533

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jupyter Untitled (unsaved changes)

Logout

File Edit View Insert Cell Kernel Widgets Help Trusted Python 3

Code

334 rows × 5 columns

In [45]: `newdf.head()`

Out[45]:

	0	1	2	3	4
0	0.3	0.403043	0.786200	0.505931	0.439403
1	0.380081	0.029315	0.020479	0.253318	0.605891
2	0.126679	0.341571	0.928397	0.526483	0.147200
3	0.513701	0.358099	0.741483	0.828668	0.010595
4	0.803533	0.035013	0.330713	0.057722	0.495489

In []: `newdf[0]`

Type here to search

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File Edit View Insert Cell Kernel Widgets Help Trusted Python 3

Out[45]:

	0	1	2	3	4
0	0.3	0.403043	0.786200	0.505931	0.439403
1	0.380081	0.029315	0.020479	0.253318	0.605891
2	0.126679	0.341571	0.928397	0.526483	0.147200
3	0.513701	0.358099	0.741483	0.828668	0.010595
4	0.803533	0.035013	0.330713	0.057722	0.495489

In [46]: hewdf[0]

Out[46]: 0 0.3
1 0.380081
2 0.126679
3 0.513701
4 0.803533
5 0.736996
6 0.26891

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The screenshot shows a Jupyter Notebook interface running in a web browser window. The title bar indicates the notebook is titled "Untitled" and is currently unsaved. The top menu bar includes File, Edit, View, Insert, Cell, Kernel, Widgets, and Help. On the right side of the header, there are buttons for Python 3, Trusted status, and Logout. Below the menu is a toolbar with various icons for file operations like save, new, copy, paste, and run.

The main content area displays the output of cell [45], which is a DataFrame:

	0	1	2	3	4
0	0.3	0.403043	0.786200	0.505931	0.439403
1	0.380081	0.029315	0.020479	0.253318	0.605891
2	0.126679	0.341571	0.928397	0.526483	0.147200
3	0.513701	0.358099	0.741483	0.828668	0.010595
4	0.803533	0.035013	0.330713	0.057722	0.495489

Below the DataFrame, the code for cell [47] is shown:

```
In [47]: type(newdf[0])
```

The output of this code is:

```
Out[47]: pandas.core.series.Series
```

There is also an empty input cell below:

```
In [ ]:
```

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jupyter Untitled (unsaved changes)

Logout

File Edit View Insert Cell Kernel Widgets Help Trusted Python 3

Run Cell Code

```
3 0.513701 0.358099 0.741483 0.828668 0.010595
4 0.803533 0.035013 0.330713 0.057722 0.495489
```

In [49]: newdf2 = newdf

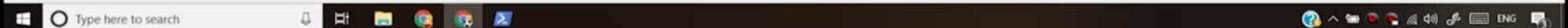
In [50]: newdf2[0][0] = 9783

AUTO

```
c:\users\haris\appdata\local\programs\python\python37-32\lib\site-packages\ipykernel_launcher.py:1: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame

See the caveats in the documentation: http://pandas.pydata.org/pandas-docs/stable/indexing.html#indexing-view-versus-copy
    """Entry point for launching an IPython kernel.
```

In []: newdf



The screenshot shows a Jupyter Notebook running in a browser window. The title bar says "jupyter Untitled (unsaved changes)". The toolbar includes File, Edit, View, Insert, Cell, Kernel, Widgets, Help, Trusted, Python 3, and Logout. Below the toolbar is a toolbar with icons for file operations like Open, Save, New, Copy, Paste, and Run. The main area contains three code cells:

- In [49]: `newdf2 = newdf.copy()`
- In [50]: `newdf2[0][0] = 9783`

c:\users\haris\appdata\local\programs\python\python37-32\lib\site-packages\ipykernel_launcher.py:1: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame

See the caveats in the documentation: <http://pandas.pydata.org/pandas-docs/stable/indexing.html#indexing-view-versus-copy>
"""Entry point for launching an IPython kernel.
- In [51]: `newdf`

The output for In [50] is a DataFrame with index 0 and columns 0 through 4, containing the value 9783 at index 0, column 0. The output for In [51] is the same DataFrame, showing all values as 0.439403.

At the bottom, the taskbar shows the Windows Start button, a search bar, and icons for File Explorer, Google Chrome, and other applications. The system tray shows network, battery, and volume status.

The screenshot shows a Jupyter Notebook running in a browser window. The title bar says "jupyter Untitled (unsaved changes)". The toolbar includes File, Edit, View, Insert, Cell, Kernel, Widgets, Help, Trusted (unchecked), and Python 3 (selected). Below the toolbar is a toolbar with icons for file operations like Open, Save, New, Copy, Paste, and Run. The main area displays the following code and its output:

```
In [55]: newdf2 = newdf.copy()
In [56]: newdf2[0][0] = 97835
          c:\users\haris\appdata\local\programs\python\python37-32\lib\site-packages\ipykernel_launcher.py:1: SettingWithCopyWarning:
          A value is trying to be set on a copy of a slice from a DataFrame
          See the caveats in the documentation: http://pandas.pydata.org/pandas-docs/stable/indexing.html#indexing-view-versus-copy
          """Entry point for launching an IPython kernel.
In [57]: newdf
```

The browser address bar shows "localhost:8888/notebooks/Untitled.ipynb?kernel_name=python3". The taskbar at the bottom includes icons for File Explorer, Edge, Google Chrome, and File Manager.

The screenshot shows a Jupyter Notebook interface running in a web browser window. The title bar indicates the notebook is titled "Untitled" and is currently unsaved. The menu bar includes File, Edit, View, Insert, Cell, Kernel, Widgets, and Help. A toolbar below the menu contains icons for file operations like Open, Save, and New, along with Run, Cell, and Kernel selection buttons. The Python version is set to "Python 3".

In [55]: `newdf2 = newdf.copy()`

In [56]: `newdf2[0][0] = 9783`

c:\users\haris\appdata\local\programs\python\python37-32\lib\site-packages\ipykernel_launcher.py:1: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame

See the caveats in the documentation: <http://pandas.pydata.org/pandas-docs/stable/indexing.html#indexing-view-versus-copy>
"""Entry point for launching an IPython kernel.

In [54]: `newdf`

Out[54]:

	0	1	2	3	4
0	9783	0.403043	0.786200	0.505931	0.439403

The screenshot shows a Jupyter Notebook interface running in a browser window. The title bar indicates the notebook is titled "Untitled" and is currently unsaved. The toolbar includes standard file operations like Home, New, Open, Save, and a Run button. The menu bar offers options for File, Edit, View, Insert, Cell, Kernel, Widgets, and Help. A status bar at the bottom shows the kernel is set to "Python 3".

The main content area displays a data frame named "newdf". The first few rows of the data frame are shown:

	0	1	2	3	4
0	654	0.403043	0.786200	0.505931	0.439403
1	0.380081	0.029315	0.020479	0.253318	0.605891

The cell history shows the following interactions:

- In [58]: `newdf.loc[0,0] = 654`
- In [59]: `newdf.head(2)`
- Out[59]: The output of the previous command, displaying the modified data frame.
- In []: An empty cell for the next input.

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Out[59]:

	0	1	2	3	4
0	654	0.403043	0.786200	0.505931	0.439403
1	0.380081	0.029315	0.020479	0.253318	0.605891

In [60]: newdf.columns = list("ABCDE")

In [61]: newdf

Out[61]:

	A	B	C	D	E
0	654	0.403043	0.786200	0.505931	0.439403
1	0.380081	0.029315	0.020479	0.253318	0.605891
2	0.126679	0.341571	0.928397	0.526483	0.147200
3	0.513701	0.358099	0.741483	0.828668	0.010595
4	0.803533	0.035013	0.330713	0.057722	0.495489

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File Edit View Insert Cell Kernel Widgets Help Trusted Python 3

A B C D E

	A	B	C	D	E
0	654	0.403043	0.786200	0.505931	0.439403
1	0.380081	0.029315	0.020479	0.253318	0.605891

In [66]: newdf.loc[0, 'A'] = 65445

In [67]: newdf.head()

Out[67]:

	A	B	C	D	E	0
0	65445	0.403043	0.786200	0.505931	0.439403	654.0
1	0.380081	0.029315	0.020479	0.253318	0.605891	NaN
2	0.1266679	0.341571	0.928397	0.526483	0.147200	NaN
3	0.513701	0.358099	0.741483	0.828668	0.010595	NaN
4	0.803533	0.035013	0.330713	0.057722	0.495489	NaN

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The screenshot shows a Jupyter Notebook interface running in a browser window. The title bar indicates it's an 'Untitled' notebook on 'localhost:8888'. The toolbar includes standard file operations like Save, New, and Delete, along with Run, Cell, Kernel, Widgets, and Help buttons. A Python 3 kernel icon is present, and the status bar shows 'Trusted'.

The main area displays a DataFrame with columns labeled A through F and index numbers 0 through 4. The first row contains numerical values: 65445, 0.403043, 0.786200, 0.505931, 0.439403, and 654.0. The second row contains 0.380081, 0.029315, 0.020479, 0.253318, 0.605891, and NaN. The third row contains 0.126679, 0.341571, 0.928397, 0.526483, 0.147200, and NaN. The fourth row contains 0.513701, 0.358099, 0.741483, 0.828668, 0.010595, and NaN. The fifth row contains 0.803533, 0.035013, 0.330713, 0.057722, 0.495489, and NaN.

A tooltip with the word 'AUTO' is visible over the index column header '0' in the fourth row.

In the bottom-left cell, the command `newdf.drop(0, axis=1)` is entered. In the bottom-right cell, the resulting DataFrame is shown, which is identical to the original one except it has one less row (index 0 is missing), starting from index 1.

	A	B	C	D	E	F
0	65445	0.403043	0.786200	0.505931	0.439403	654.0
1	0.380081	0.029315	0.020479	0.253318	0.605891	NaN
2	0.126679	0.341571	0.928397	0.526483	0.147200	NaN
3	0.513701	0.358099	0.741483	0.828668	0.010595	NaN
4	0.803533	0.035013	0.330713	0.057722	0.495489	NaN

In [68]: `newdf.drop(0, axis=1)`

Out[68]:

	A	B	C	D	E	F
1	0.380081	0.029315	0.020479	0.253318	0.605891	NaN
2	0.126679	0.341571	0.928397	0.526483	0.147200	NaN
3	0.513701	0.358099	0.741483	0.828668	0.010595	NaN
4	0.803533	0.035013	0.330713	0.057722	0.495489	NaN
5	0.736996	0.290971	0.556454	0.038279	0.981708	NaN

The screenshot shows a Jupyter Notebook interface running in a browser window. The title bar indicates the notebook is titled "Untitled" and is autosaved. The toolbar includes standard file operations like Open, Save, and New, along with Run, Cell Type (Code/Text), and Kernel selection (Python 3). A status bar at the bottom shows the kernel name as "python3".

The main content area displays a DataFrame:

	A	B	C	D	E
0	65445	0.403043	0.786200	0.505931	0.439403
1	0.380081	0.029315	0.020479	0.253318	0.605891
2	0.126679	0.341571	0.928397	0.526483	0.147200
3	0.513701	0.358099	0.741483	0.828668	0.010595
4	0.803533	0.035013	0.330713	0.057722	0.495489

In [69]: `newdf.drop(0, axis=1)`

Out[69]:

	A	B	C	D	E
0	65445	0.403043	0.786200	0.505931	0.439403
1	0.380081	0.029315	0.020479	0.253318	0.605891
2	0.126679	0.341571	0.928397	0.526483	0.147200
3	0.513701	0.358099	0.741483	0.828668	0.010595
4	0.803533	0.035013	0.330713	0.057722	0.495489

The screenshot shows a Jupyter Notebook running in a browser window. The title bar indicates the notebook is titled "Untitled" and is currently unsaved. The toolbar includes standard file operations like File, Edit, View, Insert, Cell, Kernel, Widgets, and Help, along with a Python 3 kernel selection. Below the toolbar is a toolbar with various icons for file operations such as save, new, copy, paste, and run.

The main content area displays a table of data and some code execution history:

	A	B	C	D	E
0	65445	0.403043	0.786200	0.505931	0.439403
1	0.380081	0.029315	0.020479	0.253318	0.605891
2	0.126679	0.341571	0.928397	0.526483	0.147200
3	0.513701	0.358099	0.741483	0.828668	0.010595
4	0.803533	0.035013	0.330713	0.057722	0.495489

```
In [70]: newdf = newdf.drop(0, axis=1)
```

```
In [71]: newdf.head()
```

Out[71]:

	A	B	C	D	E
0	65445	0.403043	0.786200	0.505931	0.439403
1	0.380081	0.029315	0.020479	0.253318	0.605891
2	0.126679	0.341571	0.928397	0.526483	0.147200
3	0.513701	0.358099	0.741483	0.828668	0.010595
4	0.803533	0.035013	0.330713	0.057722	0.495489

The screenshot shows a Jupyter Notebook interface running in a web browser window. The title bar indicates the notebook is titled "Untitled" and is currently unsaved. The toolbar includes standard file operations like File, Edit, View, Insert, Cell, Kernel, Widgets, and Help, along with a Python 3 kernel selection. A toolbar below the menu bar contains icons for file operations such as save, new, copy, paste, and run.

The main content area displays a DataFrame:

	0	1	2	3	4
0	65445	0.403043	0.786200	0.505931	0.439403
1	0.380081	0.029315	0.020479	0.253318	0.605891
2	0.126679	0.341571	0.928397	0.526483	0.147200
3	0.513701	0.358099	0.741483	0.828668	0.010595
4	0.803533	0.035013	0.330713	0.057722	0.495489

A code cell (In [72]) shows the command used to select specific rows and columns from the DataFrame:

```
newdf.loc[[1,2], ['C', 'D']]
```

The output (Out[72]) shows the resulting DataFrame:

	C	D
1	0.020479	0.253318
2	0.928397	0.526483

An empty input cell (In []) is visible at the bottom.

The screenshot shows a Jupyter Notebook running in a browser window. The title bar indicates it's an 'Untitled' notebook. The toolbar includes standard options like File, Edit, View, Insert, Cell, Kernel, Widgets, Help, and a Python 3 kernel selection. Below the toolbar is a toolbar with icons for file operations, cell execution, and code cell selection.

In [72]: newdf.loc[[1,2], ['C', 'D']]

Out[72]:

	C	D
1	0.020479	0.253318
2	0.928397	0.526483

In [73]: newdf.head()

Out[73]:

	A	B	C	D	E
0	65445	0.403043	0.786200	0.505931	0.439403
1	0.380081	0.029315	0.020479	0.253318	0.605891
2	0.126679	0.341571	0.928397	0.526483	0.147200
3	0.513701	0.358099	0.741483	0.828668	0.010595

The screenshot shows a Jupyter Notebook interface running in a web browser. The title bar indicates the notebook is titled "Untitled" and is currently unsaved. The toolbar includes standard file operations like Open, Save, and New, along with Run, Kernel, and Help buttons. A Python 3 kernel is selected. Below the toolbar is a code editor with a toolbar above it containing icons for file operations, cell selection, and execution.

The main content area displays a table of data:

	0	1	2	3	4
0	65445	0.403043	0.786200	0.505931	0.439403
1	0.380081	0.029315	0.020479	0.253318	0.605891
2	0.126679	0.341571	0.928397	0.526483	0.147200
3	0.513701	0.358099	0.741483	0.828668	0.010595
4	0.803533	0.035013	0.330713	0.057722	0.495489

A code cell is highlighted with a green border, showing the command used to select specific rows and columns:

```
In [74]: newdf.loc[[], ['C', 'D']]
```

The output of this cell is:

	C	D
0	0.786200	0.505931
1	0.020479	0.253318
2	0.928397	0.526483
3	0.741483	0.828668
4	0.330713	0.057722

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jupyter Untitled (unsaved changes)

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A B C D E

	0	1	2	3	4
0	65445	0.403043	0.786200	0.505931	0.439403
1	0.380081	0.029315	0.020479	0.253318	0.605891
2	0.126679	0.341571	0.928397	0.526483	0.147200
3	0.513701	0.358099	0.741483	0.828668	0.010595
4	0.803533	0.035013	0.330713	0.057722	0.495489

In [74]: newdf.loc[:, ['C', 'D']]

Out[74]:

	C	D
0	0.786200	0.505931
1	0.020479	0.253318
2	0.928397	0.526483
3	0.741483	0.828668
4	0.330713	0.057722

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A B C D E

	A	B	C	D	E
0	65445	0.403043	0.786200	0.505931	0.439403
1	0.380081	0.029315	0.020479	0.253318	0.605891
2	0.126679	0.341571	0.928397	0.526483	0.147200
3	0.513701	0.358099	0.741483	AUTO	0.1505
4	0.803533	0.035013	0.330713	-0.057722	0.495489

In [75]: newdf.loc[[1,2], :]

Out[75]:

	A	B	C	D	E
1	0.380081	0.029315	0.020479	0.253318	0.605891
2	0.126679	0.341571	0.928397	0.526483	0.147200

In []:

Type here to search

The screenshot shows a Jupyter Notebook interface running in a web browser. The title bar indicates it's an 'Untitled' notebook. The toolbar includes standard options like File, Edit, View, Insert, Cell, Kernel, Widgets, Help, and a Python 3 kernel selector. Below the toolbar is a toolbar with icons for file operations (Save, New, Copy, Paste, Find, etc.) and cell execution (Run, Cell, Kernel, etc.).

The main content area displays two code cells and their outputs:

```
In [77]: newdf.loc[(newdf['A'] < 0.3)]
```

```
Out[77]:
```

	A	B	C	D	E
2	0.126679	0.341571	0.928397	0.526483	0.147200
6	0.26891	0.448890	0.601703	0.585790	0.148410
8	0.258721	0.585082	0.764742	0.862208	0.331231
9	0.239536	0.779391	0.778879	0.888739	0.612924
15	0.105457	0.745726	0.152744	0.714716	0.030800
17	0.0296054	0.389123	0.015331	0.277467	0.301271
22	0.0187808	0.805346	0.906234	0.976583	0.211515
23	0.225627	0.312032	0.259511	0.563166	0.851494
24	0.197700	0.577000	0.014105	0.5C1C94	0.9C144C

The cell In [77] contains the command `newdf.loc[(newdf['A'] < 0.3)]`. The output Out[77] shows a DataFrame with columns A, B, C, D, and E. The row with index 8 is highlighted with a blue outline, and the value 0.258721 in that row is also highlighted with a cursor.

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Out[75]:

	A	B	C	D	E
1	0.380081	0.029315	0.020479	0.253318	0.605891
2	0.126679	0.341571	0.928397	0.526483	0.147200

In [77]: newdf.loc[(newdf['A']<0.3)]

Out[77]:

	A	B	C	D	E
2	0.126679	0.341571	0.928397	0.526483	0.147200
6	0.26891	0.448890	0.601703	0.585790	0.148410
8	0.258721	0.585082	0.764742	0.862208	0.331231
9	0.239536	0.779391	0.778879	0.888739	0.612924
15	0.105457	0.745726	0.152744	0.714716	0.030800
17	0.0296054	0.389123	0.015331	0.277467	0.301271
22	0.0187808	0.805346	0.906234	0.976583	0.211515

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Out[75]:

	A	B	C	D	E
1	0.380081	0.029315	0.020479	0.253318	0.605891
2	0.126679	0.341571	0.928397	0.526483	0.147200

In [78]: newdf.loc[(newdf['A']<0.3) & (newdf['C']>0.1)]

Out[78]:

	A	B	C	D	E
2	0.126679	0.341571	0.928397	0.526483	0.147200
6	0.26891	0.448890	0.601703	0.585790	0.148410
8	0.258721	0.585082	0.764742	0.862208	0.331231
9	0.239536	0.779391	0.778879	0.888739	0.612924
15	0.105457	0.745726	0.152744	0.714716	0.030800
22	0.0187808	0.805346	0.906234	0.976583	0.211515
23	0.225627	0.312032	0.259511	0.563166	0.951494

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In [81]: `newdf.head(2)`

Out[81]:

	A	B	C	D	E
0	65445	0.403043	0.786200	0.505931	0.439403
1	0.380081	0.029315	0.020479	0.253318	0.605891

In [82]: `newdf.iloc[0,4]`

Out[82]: 0.439402751996007

In []:

Type here to search

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A B C D E

	A	B	C	D	E
0	65445	0.403043	0.786200	0.505931	0.439403
1	0.380081	0.029315	0.020479	0.253318	0.605891

In [82]: newdf.iloc[0,4]

Out[82]: 0.439402751996007

In [83]: newdf.iloc[[0,1], [1,2]]

Out[83]:

	B	C
0	0.403043	0.786200
1	0.029315	0.020479

In []:

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A B C D E

0	65445	0.403043	0.786200	0.505931	0.439403
1	0.380081	0.029315	0.020479	0.253318	0.605891

In [82]: newdf.iloc[0,4]

Out[82]: 0.439402751996007

In [84]: newdf.iloc[[0,5], [1,2]]

Out[84]:

	B	C
0	0.403043	0.786200
5	0.290971	0.556454

In []:

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A B C D E

0	65445	0.403043	0.786200	0.505931	0.439403
1	0.380081	0.029315	0.020479	0.253318	0.605891

In [82]: newdf.iloc[0,4]

Out[82]: 0.439402751996007

In [83]: newdf.iloc[[0,1], [1,2]]

Out[83]:

	B	C
0	0.403043	0.786200
1	0.029315	0.020479

In []:

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File Edit View Insert Cell Kernel Widgets Help Trusted Python 3

A B C D E

0	65445	0.403043	0.786200	0.505931	0.439403
1	0.380081	0.029315	0.020479	0.253318	0.605891

In [82]: newdf.iloc[0,4]

Out[82]: 0.439402751996007

In [84]: newdf.iloc[[0,5], [1,2]]

Out[84]:

	B	C
0	0.403043	0.786200
5	0.290971	0.556454

In []:

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Code

0 0.403043 0.786200
5 0.290971 0.556454

In [85]: newdf.head(3)

Out[85]:

	A	B	C	D	E
0	65445	0.403043	0.786200	0.505931	0.439403
1	0.380081	0.029315	0.020479	0.253318	0.605891
2	0.126679	0.341571	0.928397	0.526483	0.147200

In []:

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In [85]: newdf.head(3)

Out[85]:

	A	B	C	D	E
0	65445	0.403043	0.786200	0.505931	0.439403
1	0.380081	0.029315	0.020479	0.253318	0.605891
2	0.126679	0.341571	0.928397	0.526483	0.147200

In [86]: newdf.drop([0])

Out[86]:

	A	B	C	D	E
1	0.380081	0.029315	0.020479	0.253318	0.605891
2	0.126679	0.341571	0.928397	0.526483	0.147200
3	0.513701	0.358099	0.741483	0.828668	0.010595
4	0.803533	0.035013	0.330713	0.057722	0.495489
5	0.736996	0.290971	0.556454	0.038279	0.981708

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Logout

File Edit View Insert Cell Kernel Widgets Help Trusted Python 3

In [85]: newdf.head(3)

Out[85]:

	A	B	C	D	E
0	65445	0.403043	0.786200	-0.505931	-0.439403
1	0.380081	0.029315	0.020479	0.253318	0.605891
2	0.126679	0.341571	0.928397	0.526483	0.147200

In [88]: newdf.drop(['A'], axis=1)

Out[88]:

	B	C	D	E
0	0.403043	0.786200	0.505931	0.439403
1	0.029315	0.020479	0.253318	0.605891
2	0.341571	0.928397	0.526483	0.147200

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The screenshot shows a Jupyter Notebook interface running in a browser window. The title bar indicates the notebook is titled "Untitled" and is currently unsaved. The toolbar includes standard file operations like Home, New, Open, Save, and a search bar. A Python logo icon and a "Logout" button are also present.

The menu bar offers options like File, Edit, View, Insert, Cell, Kernel, Widgets, and Help. Below the menu is a toolbar with icons for file operations (Save, New, Open, etc.) and cell execution (Run, Cell, Kernel, Help). The kernel is set to "Python 3".

The main workspace displays a table with columns labeled A through E. The first few rows of data are:

	A	B	C	D	E
0	65445	0.403043	0.786200	0.505931	0.439403
1	0.380081	0.029315	0.020479	0.253318	0.605891
2	0.126679	0.341571	0.928397	0.526483	0.147200

In [89]: `newdf.drop(['A', 'C'], axis=1)`

Out[89]:

	B	D	E
0	0.403043	0.505931	0.439403
1	0.029315	0.253318	0.605891
2	0.341571	0.526483	0.147200
3	0.358099	0.828668	0.010595
4	0.035013	0.057722	0.495489
5	0.290971	0.038279	0.981708
6	0.448800	0.535700	0.148410

The screenshot shows a Jupyter Notebook running in a browser window. The title bar says "jupyter Untitled (unsaved changes)". The toolbar includes File, Edit, View, Insert, Cell, Kernel, Widgets, Help, Trusted, Python 3, and Logout. Below the toolbar is a toolbar with icons for file operations like save, new, copy, paste, and run. The main area displays a table and two code cells.

A table with columns A, B, C, D, and E is shown:

	A	B	C	D	E
0	65445	0.403043	0.786200	0.505931	0.439403
1	0.380081	0.029315	0.020479	0.253318	0.605891
2	0.126679	0.341571	0.928397	0.526483	0.147200

In [91]: `newdf.drop(['A', 'D'], axis=1, inplace=True)`

In [92]: `newdf`

Out[92]:

	B	C	E
0	0.403043	0.786200	0.439403
1	0.029315	0.020479	0.605891
2	0.341571	0.928397	0.147200
3	0.358099	0.741483	0.010595
4	0.035013	0.330713	0.495489

The screenshot shows a Jupyter Notebook interface running in a browser window. The title bar indicates the notebook is titled "Untitled" and is currently unsaved. The toolbar includes standard file operations like New, Open, Save, and Run, along with a Python 3 kernel selection. The main area displays a table of data and two code cells.

The table has columns labeled A through E and rows indexed 0, 1, and 2. The data is:

	A	B	C	D	E
0	65445	0.403043	0.786200	0.505931	0.439403
1	0.380081	0.029315	0.020479	0.253318	0.605891
2	0.126679	0.341571	0.928397	0.526483	0.147200

In [93]: `newdf.drop([1, 5], axis=0, inplace=True)`

In [92]: `newdf`

Out[92]:

	B	C	E
0	0.403043	0.786200	0.439403
1	0.029315	0.020479	0.605891
2	0.341571	0.928397	0.147200
3	0.358099	0.741483	0.010595
4	0.035013	0.330713	0.495489

The screenshot shows a Jupyter Notebook interface running in a web browser. The title bar indicates the notebook is titled "Untitled" and is currently unsaved. The toolbar includes standard file operations like Open, Save, and New, along with Run, Cell, Kernel, Widgets, and Help buttons. A Python 3 kernel icon is present, and the status bar shows the notebook is running on "localhost:8888".

In [93]: `newdf.drop([1, 5], axis=0, inplace=True)`

In [94]: `newdf`

Out[94]:

	B	C	E
0	0.403043	0.786200	0.439403
2	0.341571	0.928397	0.147200
3	0.358099	0.741483	0.010595
4	0.035013	0.330713	0.495489
6	0.448890	0.601703	0.148410
7	0.732357	0.076276	0.044649
8	0.585082	0.764742	0.331231

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jupyter Untitled (unsaved changes)

Logout

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In [95]: newdf.head(3)

Out[95]:

	B	C	E
0	0.403043	0.786200	0.439403
2	0.341571	0.928397	0.147200
3	0.358099	0.741483	0.010595

In [96]: newdf.reset_index()

Out[96]:

index	B	C	E	
0	0	0.403043	0.786200	0.439403
1	2	0.341571	0.928397	0.147200
2	3	0.358099	0.741483	0.010595
3	4	0.035013	0.330713	0.495489
4	6	0.448890	0.601703	0.148410

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jupyter Untitled (unsaved changes)

Logout

File Edit View Insert Cell Kernel Widgets Help Trusted Python 3

In [95]: newdf.head(3)

Out[95]:

	B	C	E
0	0.403043	0.786200	0.439403
2	0.341571	0.928397	0.147200
3	0.358099	0.741483	0.010595

In [96]: newdf.reset_index()

Out[96]:

index	B	C	E	
0	0	0.403043	0.786200	0.439403
1	2	0.341571	0.928397	0.147200
2	3	0.358099	0.741483	0.010595
3	4	0.035013	0.330713	0.495489
4	6	0.448890	0.601703	0.148410

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jupyter Untitled (unsaved changes)

Logout

File Edit View Insert Cell Kernel Widgets Help Trusted Python 3

In [95]: `newdf.head(3)`

Out[95]:

	B	C	E
0	0.403043	0.786200	0.439403
2	0.341571	0.928397	0.147200
3	0.358099	0.741483	0.010595

In [97]: `newdf.reset_index(drop=True)`

Out[97]:

	B	C	E
0	0.403043	0.786200	0.439403
1	0.341571	0.928397	0.147200
2	0.358099	0.741483	0.010595
3	0.035013	0.330713	0.495489
4	0.448890	0.601703	0.148410

Type here to search

The screenshot shows a Jupyter Notebook interface running in a web browser window. The title bar indicates the notebook is titled "Untitled" and is currently unsaved. The toolbar includes standard file operations like Home, New, Open, Save, and Print, along with a Python logo icon and a Logout button. The menu bar offers options for File, Edit, View, Insert, Cell, Kernel, Widgets, and Help. A status bar at the bottom shows the kernel name as "Python 3".

In [95]: `newdf.head(3)`

Out[95]:

	B	C	E
0	0.403043	0.786200	0.439403
2	0.341571	0.928397	0.147200
3	0.358099	0.741483	0.010595

In [98]: `newdf.reset_index(drop=True, inplace=True)`

In []: `newdf.head|`

The screenshot shows a Jupyter Notebook interface running in a web browser. The title bar indicates the notebook is titled "Untitled" and is currently unsaved. The toolbar includes standard file operations like File, Edit, View, Insert, Cell, Kernel, Widgets, and Help, along with a Python 3 kernel selection. Below the toolbar is a toolbar with icons for file operations like save, new, copy, paste, and run.

The main content area displays a table output from a previous cell:

	B	C	E
0	0.403043	0.786200	0.439403
2	0.341571	0.928397	0.147200
3	0.358099	0.741483	0.010595

Below this, two code cells are shown:

```
In [98]: newdf.reset_index(drop=True, inplace=True)
```

```
In [99]: newdf.head(3)
```

The output for the second cell is:

	B	C	E
0	0.403043	0.786200	0.439403
1	0.341571	0.928397	0.147200
2	0.358099	0.741483	0.010595

The bottom of the window shows the Windows taskbar with the search bar containing "Type here to search".

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jupyter Untitled (unsaved changes) Logout

File Edit View Insert Cell Kernel Widgets Help Trusted Python 3

In [98]: `newdf.reset_index(drop=True, inplace=True)`

In [99]: `newdf.head(3)`

Out[99]:

	B	C	E
0	0.403043	0.786200	0.439403
1	0.341571	0.928397	0.147200
2	0.358099	0.741483	0.010595

In [100]: `newdf['B'].isnull()`

Out[100]:

0	False
1	False
2	False
3	False
4	False
5	False

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In [58]: `newdf.head(3)`

Out[58]:

	B	C	E
0	0.832099	0.680755	0.991099
1	0.759512	0.670046	0.160494
2	0.215237	0.952256	0.687310

AUTO

In [62]: `newdf['B'] = None`

In []:

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Code

	B	C	E
0	0.832099	0.680755	0.991099
1	0.759512	0.670046	0.160494
2	0.215237	0.952256	0.687310

In [62]: `newdf['B'] = None`

In [63]: `newdf`

Out[63]:

	B	C	E
0	None	0.680755	0.991099
1	None	0.670046	0.160494
2	None	0.952256	0.687310
3	None	0.560026	0.859325
4	None	0.468526	0.862170

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In [58]: `newdf.head(3)`

Out[58]:

	B	C	E
0	0.832099	0.680755	0.991099
1	0.759512	0.670046	0.160494
2	0.215237	0.952256	0.687310

In [62]: `newdf['B'] = None`

In [64]: `newdf['B'].isnull()`

Out[64]:

0	True
1	True
2	True
3	True
4	True
5	True

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In [58]: `newdf.head(3)`

Out[58]:

	B	C	E
0	0.832099	0.680755	0.991099
1	0.759512	0.670046	0.160494
2	0.215237	0.952256	0.687310

In [66]: `newdf.loc[:, ['B']] = None`

In [64]: `newdf['B'].isnull()`

Out[64]:

0	True
1	True
2	True
3	True
4	True
5	True
6	True

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In [66]: `newdf.loc[:, ['B']] = None`

In [67]: `newdf`

Out[67]:

	B	C	E
0	None	0.680755	0.991099
1	None	0.670046	0.160494
2	None	0.952256	0.687310
3	None	0.560026	0.859325
4	None	0.468526	0.962170
5	None	0.911625	0.024822
6	None	0.590928	0.460780
7	None	0.408686	0.545442
8	None	0.549704	0.769127

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In [58]: `newdf.head(3)`

Out[58]:

	B	C	E
0	0.832099	0.680755	0.991099
1	0.759512	0.670046	0.160494
2	0.215237	0.952256	0.687310

In [68]: `newdf.loc[:, ['B']] = 56`

In [69]: `newdf`

Out[69]:

	B	C	E
0	56	0.680755	0.991099
1	56	0.670046	0.160494
2	56	0.952256	0.687310

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Code

1	34	0.670046	0.160494
2	34	0.952256	0.687310
3	34	0.560026	0.859325
4	34	0.468526	0.962170

```
In [73]: df = pd.DataFrame({"name": ['Alfred', 'Batman', 'Catwoman'],
                           "toy": [np.nan, 'Batmobile', 'Bullwhip'],
                           "born": [pd.NaT, pd.Timestamp("1940-04-25"),
                                    pd.NaT]})
```

```
In [ ]: df
```

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In [74]: df.head()

Out[74]:

	name	toy	born
0	Alfred	NaN	NaT
1	Batman	Batmobile	1940-04-25
2	Catwoman	Bullwhip	NaT

In []: df.drop|

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In [74]: `df.head()`

Out[74]:

	name	toy	born
0	Alfred	NaN	NaT
1	Batman	Batmobile	1940-04-25
2	Catwoman	Bullwhip	NaT

In [75]: `df.dropna()`

Out[75]:

	name	toy	born
1	Batman	Batmobile	1940-04-25

In []:

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In [74]: df.head()

Out[74]:

	name	toy	born
0	Alfred	NaN	NaT
1	Batman	Batmobile	1940-04-25
2	Catwoman	Bullwhip	NaT

In [76]: df.dropna(how='all')

Out[76]:

	name	toy	born
0	Alfred	NaN	NaT
1	Batman	Batmobile	1940-04-25
2	Catwoman	Bullwhip	NaT

In []:

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4 34 0.468526 0.962170

```
In [77]: df = pd.DataFrame({"name": ['Alfred', 'Batman', 'Catwoman'],
                           "toy": [np.nan, np.nan, np.nan],
                           "born": [pd.NaT, pd.Timestamp("1940-04-25"),
                                    pd.NaT]})
```

```
In [78]: df.head()
```

```
Out[78]:
```

	name	toy	born
0	Alfred	NaN	NaT
1	Batman	NaN	1940-04-25
2	Catwoman	NaN	NaT

```
In [76]: df.dropna(how='all')
```

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Code

	name	toy	born
1	Batman	NaN	1940-04-25
2	Catwoman	NaN	NaT

In [79]: `df.dropna(how='all')`

Out[79]:

	name	toy	born
0	Alfred	NaN	NaT
1	Batman	NaN	1940-04-25
2	Catwoman	NaN	NaT

In []:

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Code

	name	toy	born
0	Alfred	NaN	NaT
1	Batman	NaN	1940-04-25
2	Catwoman	NaN	NaT

In [83]: `df.dropna(how='all', axis=1)`

Out[83]:

	name	born
0	Alfred	NaT
1	Batman	1940-04-25
2	Catwoman	NaT

In []:

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In [88]: `df.head()`

Out[88]:

	name	toy	born
0	Alfred	NaN	NaT
1	Batman	Batmobile	1940-04-25
2	Alfred	Bullwhip	NaT

In [83]: `df.dropna(how='all', axis=1)`

Out[83]:

	name	born
0	Alfred	NaT
1	Batman	1940-04-25
2	Catwoman	NaT

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	name	born
0	Alfred	NaN
1	Batman	Batmobile 1940-04-25
2	Alfred	Bullwhip NaN

In [83]: `df.dropna(how='all', axis=1)`

Out[83]:

	name	born
0	Alfred	NaN
1	Batman	1940-04-25
2	Catwoman	NaN

In [92]: `df.drop_duplicates(subset=['name'])`

KeyError Traceback (most recent call last)
`<ipython-input-92-7cb4b71deffd>` in <module>

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In [83]: `df.dropna(how='all', axis=1)`

Out[83]:

	name	born
0	Alfred	NaT
1	Batman	1940-04-25
2	Catwoman	NaT

In [94]: `df.drop_duplicates(subset=['name'], keep='first')`

Out[94]:

	name	toy	born
0	Alfred	NaN	NaT
1	Batman	Batmobile	1940-04-25

54:13 / 1:05:24

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In [83]: df.dropna(how='all', axis=1)

Out[83]:

	name	born
0	Alfred	NaT
1	Batman	1940-04-25
2	Catwoman	NaT



In [94]: df.drop_duplicates(subset=['name'], keep='first')

Out[94]:

	name	toy	born
0	Alfred	NaN	NaT
1	Batman	Batmobile	1940-04-25

54:13 / 1:05:24



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In [83]: `df.dropna(how='all', axis=1)`

Out[83]:

	name	born
0	Alfred	NaT
1	Batman	1940-04-25
2	Catwoman	NaT

In [95]: `df.drop_duplicates(subset=['name'], keep='last')`

Out[95]:

	name	toy	born
1	Batman	Batmobile	1940-04-25
2	Alfred	Bullwhip	NaT

In []:

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In [83]: `df.dropna(how='all', axis=1)`

Out[83]:

	name	born
0	Alfred	NaT
1	Batman	1940-04-25
2	Catwoman	NaT

AUTO

In [96]: `df.drop_duplicates(subset=['name'], keep=False)`

Out[96]:

	name	toy	born
1	Batman	Batmobile	1940-04-25

In []:

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Out[96]:

	name	toy	born
1	Batman	Batmobile	1940-04-25

In [97]: df.shape

Out[97]: (3, 3)

In [99]: df.info()

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 3 entries, 0 to 2
Data columns (total 3 columns):
name    3 non-null object
toy     2 non-null object
born    1 non-null datetime64[ns]
dtypes: datetime64[ns](1), object(2)
memory usage: 88.0+ bytes
```

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Run

Data columns (total 3 columns):
name 3 non-null object
toy 2 non-null object
born 1 non-null datetime64[ns]
dtypes: datetime64[ns](1), object(2)
memory usage: 88.0+ bytes

In [100]: df['name'].value_counts(dropna=False)

Out[100]: Alfred 2
Batman 1
Name: name, dtype: int64

In []:

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```
Data columns (total 3 columns):  
 name      3 non-null object  
 toy       2 non-null object  
 born      1 non-null datetime64[ns]  
 dtypes: datetime64[ns](1), object(2)  
 memory usage: 88.0+ bytes
```

In [101]: `df['toy'].value_counts(dropna=False)`

Out[101]:

Batmobile	1
Bullwhip	1
NaN	1

Name: toy, dtype: int64

In []:

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```
Data columns (total 3 columns):  
 name      3 non-null object  
 toy       2 non-null object  
 born      1 non-null datetime64[ns]  
 dtypes: datetime64[ns](1), object(2)  
 memory usage: 88.0+ bytes
```

In [102]: `df['toy'].value_counts(dropna=True)`

Out[102]:

```
Batmobile    1  
Bullwhip     1  
Name: toy, dtype: int64
```

In []:

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memory usage: 88.0+ bytes

```
In [103]: df['toy'].value_counts(dropna=False)
```

```
Out[103]: Batmobile    1  
Bullwhip      1  
NaN          1  
Name: toy, dtype: int64
```

```
In [104]: df.notnull()
```

```
Out[104]:
```

	name	toy	born
0	True	False	False
1	True	True	True
2	True	True	False

```
In [ ]:
```

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memory usage: 88.0+ bytes

In [103]: `df['toy'].value_counts(dropna=False)`

Out[103]:

Batmobile	1
Bullwhip	1
NaN	1
Name:	toy, dtype: int64

In [105]: `df.isnull()`

Out[105]:

	name	toy	born
0	False	True	True
1	False	False	False
2	False	False	True

In []:



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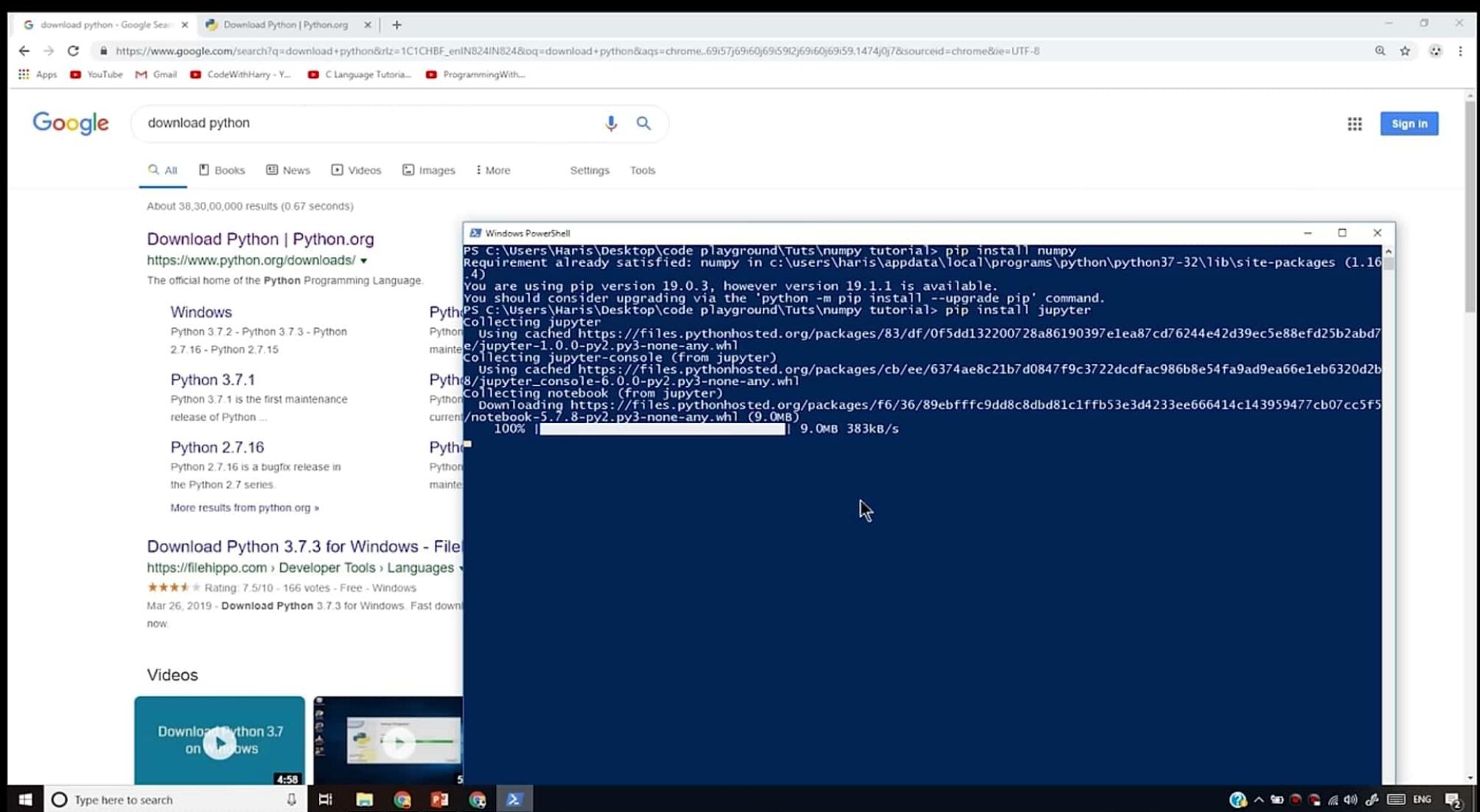


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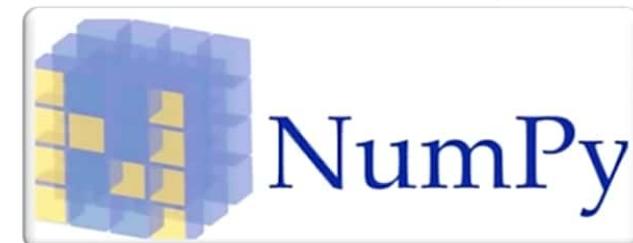
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WHY USE NUMPY?

$l1 = [1, 2, 3] \leftarrow$ C

- NumPy provides efficient storage
- It also provides better ways of handling data for processing
- It is fast
- It is easy to learn
- NumPy uses relatively less memory to store data





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Trusted Python 3

```
In [1]: import numpy as np
```

```
In [2]: print("hello world")
```

hello world

```
In [ ]:
```

```
In [ ]:
```

```
In [ ]:
```

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Py

+ Code

In [1]: `import numpy as np`

In [2]: `print("hello world")`

hello world

In [7]: `import sklearn`

In [5]: `i = 45`

In [3]: `print(7)`

7

In [4]: `i`

NameError Traceback (most recent call last)
<ipython-input-4-397d543883c5> in <module>

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Trusted Python 3

In [1]: `import numpy as np`

In [2]: `print("hello world")`
hello world

In [3]: `import sklearn`

In [4]: `i = 45`

In [5]: `print(7)`
7

In [6]: `i`
Out[6]: 45

In [7]: `i`
Out[7]: 45

In []:

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In [6]: i

Out[6]: 45

In [4]: i = 45

In [5]: print(7)

7

In [4]: i = 45

In [7]: i

Out[7]: 45

In [9]: i

Out[9]: 45

In []:

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In [1]: `import numpy as np`

In [2]: `myarr = np.array([3,6,32,7])`

In []: `myarr`

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In [2]: `myarr = np.array([3,6,32,7])`

In [3]: `myarr`

Out[3]: `array([3, 6, 32, 7])`

In []:

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Welcome to numpy tutorial

```
In [1]: import numpy as np
```

```
In [2]: myarr = np.array([3,6,32,7])
```

```
In [3]: myarr
```

```
Out[3]: array([ 3,  6, 32,  7])
```

```
In [ ]:
```

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Welcome to numpy tutorial

```
In [1]: import numpy as np
```

```
In [6]: myarr = np.array([3,6,37,7], np.int8)
```

```
In [7]: myarr
```

```
Out[7]: array([ 3,   6, -84,   7], dtype=int8)
```

```
In [ ]:
```

Welcome to numpy tutorial

```
In [1]: import numpy as np
```

```
In [8]: myarr = np.array([3,6,37,7], np.int32)
```

In [9]: myarr

Out[9]: array([3, 6, 37, 7])

In []:

Welcome to numpy tutorial

```
In [1]: import numpy as np
```

```
In [10]: myarr = np.array([3,6,37,7], np.int64)
```

In [11]: myarr

Out[11]: array([3, 6, 37, 7], dtype=int64)

In []:

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In [1]: `import numpy as np`

In [13]: `myarr = np.array([[3,6,37,7]], np.int64)`

In [14]: `myarr[0,1]`

Out[14]: 6

In []:

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In [1]: `import numpy as np`

In [17]: `myarr = np.array([[3,6,37,7]], np.int64)`

In [19]: `myarr[0, 1]`

Out[19]: 6

In []: |

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In [19]: myarr[0, 1]

Out[19]: 6

In [20]: myarr.shape

Out[20]: (1, 4)

In []:

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In [20]: myarr.shape

Out[20]: (1, 4)

In [21]: myarr.dtype

Out[21]: dtype('int64')

In []:

https://www.google.com/search?q=numpy+types+reference&rlz=1C1CHBF_enIN824IN824&oq=numpy+types+reference&aqs=chrome..69i57.2978j0j7&sourceid=chrome&ie=UTF-8

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<https://docs.scipy.org/doc/numpy/reference/> ▾
Jan 31, 2019 - This **reference** manual details functions, modules, and objects included in ... **C-Types**
Foreign Function Interface (`numpy.ctypeslib`) · Datetime ...
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<https://docs.scipy.org/doc/numpy/reference/c-api.types-and-structures.html> ▾
There are 21 statically-defined PyArray_Descr objects for the built-in data-types. While these participate in **reference** counting, their **reference** count should ...

NumPy Reference — NumPy v1.18.dev0 Manual
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routines · Optionally **Scipy**-accelerated routines (`numpy dual`) ...

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Out[5]: dtype('int64')

In [6]: myarr[0, 1]

Out[6]: 6

In [7]: myarr[0, 1] = 45

In [8]: myarr

Out[8]: array([[3, 45, 37, 7]], dtype=int64)

In []:

← → 🔍 https://www.google.com/search?q=array+creation+methods+in+numpy&rlz=1C1CHBF_enIN824IN824&oq=array+creation+methods+in+numpy&aqs=chrome..69i57j33.3879j0j7&sourceid=chrome&ie=UTF-8

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numpy.reshape(array, shape, order = 'C') : Shapes an **array** without changing data of **array**. To create sequences of numbers, **NumPy** provides a function analogous to range that returns **arrays** instead of lists.

Numpy | Array Creation - GeeksforGeeks
<https://www.geeksforgeeks.org/numpy-array-creation/>

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Array creation — NumPy v1.16 Manual
<https://docs.scipy.org/doc/numpy/user/basics.creation.html> ▾
Jan 31, 2019 - There are 5 general mechanisms for **creating arrays**: ... Check the docstring for complete information on the various **ways** it can be used. A few ...

Array creation routines — NumPy v1.13 Manual
<https://docs.scipy.org/doc/numpy-1.13.0/.../routines.array-creation.html> ▾
empty (shape[, dtype, order]), Return a new **array** of given shape and type, without initializing entries.
empty_like (a[, dtype, order, subok]), Return a new **array** ...

Different Ways to Create Numpy Arrays | Pluralsight
<https://www.pluralsight.com/guides/different-ways-create-numpy-arrays> ▾
Sep 15, 2018 - Using **Numpy** functions. **Numpy** has built-in functions for **creating arrays**. We will cover some of them in this guide.

NumPy Array Creation Routines - Tutorialspoint
https://www.tutorialspoint.com/numpy/numpy_array_creation_routines.htm ▾
NumPy Array Creation Routines - Learn **NumPy** in simple and easy steps starting ... Arithmetic
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← → C https://docs.scipy.org/doc/numpy/user/basics.creation.html

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Array creation

See also:
Array creation routines

Introduction

There are 5 general mechanisms for creating arrays:

1. Conversion from other Python structures (e.g., lists, tuples)
2. Intrinsic numpy array creation objects (e.g., arange, ones, zeros, etc.)
3. Reading arrays from disk, either from standard or custom formats
4. Creating arrays from raw bytes through the use of strings or buffers
5. Use of special library functions (e.g., random)

This section will not cover means of replicating, joining, or otherwise expanding or mutating existing arrays. Nor will it cover creating object arrays or structured arrays. Both of those are covered in their own sections.

Converting Python array_like Objects to NumPy Arrays¶

In general, numerical data arranged in an array-like structure in Python can be converted to arrays through the use of the `array()` function. The most obvious examples are lists and tuples. See the documentation for `array()` for details for its use. Some objects may support the array-protocol and allow conversion to arrays this way. A simple way to find out if the object can be converted to a numpy array using `array()` is simply to try it interactively and see if it works! (The Python Way).

Examples:

```
>>> x = np.array([2,3,1,0])
>>> x = np.array([2, 3, 0])
>>> x = np.array([[1,2,0],[0,0],(1+1j,3,)])
# note mix of tuple and lists,
# and types
>>> x = np.array([[ 1.+0.j, 2.+0.j], [ 0.+0.j, 0.+0.j], [ 1.+1.j, 3.+0.j]])
```

Intrinsic NumPy Array Creation

NumPy has built-in functions for creating arrays from scratch:

`zeros(shape)` will create an array filled with 0 values with the specified shape. The default `dtype` is `float64`.

```
>>> np.zeros((2, 3))
array([[ 0.,  0.,  0.], [ 0.,  0.,  0.]])
```

`ones(shape)` will create an array filled with 1 values. It is identical to `zeros` in all other respects.

`arange()` will create arrays with regularly incrementing values. Check the docstring for complete information on the various ways it can be used. A few examples will be given here:

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- Array creation
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There are 5 general mechanisms for creating arrays:

1. Conversion from other Python structures (e.g., lists, tuples)
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In [7]: `myarr[0, 1] = 45`

In [8]: `myarr`

Out[8]: `array([[3, 45, 37, 7]], dtype=int64)`

Array creation: Conversion from other Python structures

In []:

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Out[8]: array([3, 45, 37, 7], dtype=int64)

Array creation: Conversion from other Python structures

```
In [9]: listarray = np.array([[1,2,3], [5,8,5],[0,3,1]])
```

```
In [10]: listarray
```

```
Out[10]: array([[1, 2, 3],
 [5, 8, 5],
 [0, 3, 1]])
```

```
In [ ]: listarray.
```

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In [10]:

```
Out[10]: array([[1, 2, 3],  
                 [5, 8, 5],  
                 [0, 3, 1]])
```

In [11]:

```
listarray.dtype
```

Out[11]:

```
dtype('int32')
```

In [12]:

```
listarray.shape
```

Out[12]:

```
(3, 3)
```

In []:

```
listarray.s|
```

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In [12]: `listarray.shape`

Out[12]: `(3, 3)`

In [13]: `listarray.size`

Out[13]: `9`

In [14]: `np.array({34, 23, 23})`

Out[14]: `array([34, 23], dtype=object)`

In []:

See also:

[Array creation routines](#)

Introduction

There are 5 general mechanisms for creating arrays:

1. Conversion from other Python structures (e.g., lists, tuples)
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Out[13]: 9

In [14]: np.array({34,23,23})

Out[14]: array({34, 23}, dtype=object)

In [17]: zeros = np.zeros(2, 5)

In [18]: zeros

Out[18]: array([[0., 0., 0., 0., 0.],
[0., 0., 0., 0., 0.]])

In []:

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Out[13]: 9

In [14]: np.array({34,23,23})

Out[14]: array({34, 23}, dtype=object)

In [17]: zeros = np.zeros(2, 5)

In [20]: zeros.shape

Out[20]: (2, 5)

In []:

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Out[13]: 9

In [14]: np.array({34,23,23})

Out[14]: array({34, 23}, dtype=object)

In [17]: zeros = np.zeros(2, 5)

In [21]: zeros

Out[21]: array([[0., 0., 0., 0., 0.],
[0., 0., 0., 0., 0.]])

In []:

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In [1]: zeros = np.zeros(2, 5)

In [21]: zeros

Out[21]: array([[0., 0., 0., 0., 0.],
[0., 0., 0., 0., 0.]])

In [22]: rng = np.arange(15)

In [23]: rng

Out[23]: array([0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14])

In []:

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In [22]: `rng = np.arange(15)`

In [23]: `rng`

Out[23]: `array([0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14])`

In [24]: `linspace = np.linspace(1,5,12)`

In [25]: `linspace`

Out[25]: `array([1. , 1.36363636, 1.72727273, 2.09090909, 2.45454545,`
 `2.81818182, 3.18181818, 3.54545455, 3.90909091, 4.27272727,`
 `4.63636364, 5.])`

In []:

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In [22]: `rng = np.arange(15)`

In [23]: `rng`

Out[23]: `array([0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14])`

In [26]: `linspace = np.linspace(1,50,10)` AUTO

In [27]: `linspace`

Out[27]: `array([1. , 6.44444444, 11.88888889, 17.33333333, 22.77777778, 28.22222222, 33.66666667, 39.11111111, 44.55555556, 50.])`

In []:

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In [22]: `rng = np.arange(15)`

In [23]: `rng`

Out[23]: `array([0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14])`

In [26]: `linspace = np.linspace(1,50,10)`

In [27]: `linspace`

Out[27]: `array([1. , 6.44444444, 11.88888889, 17.33333333, 22.77777778, 28.22222222, 33.66666667, 39.11111111, 44.55555556, 50.])`

In []:

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In [22]: `rng = np.arange(15)`

In [23]: `rng`

Out[23]: `array([0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14])`

In [28]: `lspace = np.linspace(1,4,4)`

In [29]: `lspace`

Out[29]: `array([1., 2., 3., 4.])`

In []:

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In [22]: `rng = np.arange(15)`

In [23]: `rng`

Out[23]: `array([0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14])`

In [30]: `linspace = np.linspace(1,5,4)`

In [31]: `linspace`

Out[31]: `array([1. , 2.33333333, 3.66666667, 5.])`

In []:

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In [30]: `linspace = np.linspace(1,5,4)`

In [31]: `linspace`

Out[31]: `array([1. , 2.3333333, 3.6666667, 5.])`

In [32]: `emp = np.empty((4,6))`

In [33]: `emp`

Out[33]: `array([[6.23042070e-307, 1.86918599e-306, 1.69121096e-306,
 1.60218491e-306, 7.56587585e-307, 7.56593017e-307],
 [1.24610383e-306, 1.24610723e-306, 1.37962320e-306,
 1.29060871e-306, 2.22522597e-306, 1.33511969e-306],
 [1.78022342e-306, 1.05700345e-307, 1.00132653e-307,
 8.01097889e-307, 1.78020169e-306, 7.56601165e-307],
 [1.02359984e-306, 1.15710088e-306, 6.23056330e-307,
 9.34604358e-307, 8.34449806e-308, 3.91792476e-317]])`

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Out[31]: array([1. , 2.33333333, 3.66666667, 5.])

In [32]: emp = np.empty(4,6)

In [33]: emp

Out[33]: array([[6.23042070e-307, 1.86918699e-306, 1.69121096e-306, 1.60218491e-306, 7.56587585e-307, 7.56593017e-307], [1.24610383e-306, 1.24610723e-306, 1.37962320e-306, 1.29060871e-306, 2.22522597e-306, 1.33511969e-306], [1.78022342e-306, 1.05700345e-307, 1.00132653e-307, 8.01097889e-307, 1.78020169e-306, 7.56601165e-307], [1.02359984e-306, 1.15710088e-306, 6.23056330e-307, 9.34604358e-307, 8.34449806e-308, 3.91792476e-317]])

In []: em

The screenshot shows a Jupyter Notebook interface running on a Windows operating system. The browser tab bar at the top includes links for Google Search, Python.org, Home, Numpy Tutorial, and Array creation — NumPy v1.16. The Jupyter interface has a header with the title "jupyter Numpy Tutorial (unsaved changes)", a Python logo icon, and a "Logout" button. A navigation bar below the header contains File, Edit, View, Insert, Cell, Kernel, Widgets, and Help, along with Trusted and Python 3 status indicators. Below the navigation bar is a toolbar with icons for file operations (Save, New, Copy, Paste, Find, Undo, Redo), cell execution (Run, Cell, Cell Block, Run All, Cell Kernel), and code editor settings (Code, Keyboard Shortcuts). The main workspace displays two code cells and their outputs:

```
Out[33]: array([[6.23042070e-307, 1.86918699e-306, 1.69121096e-306,
   1.60218491e-306, 7.56587585e-307, 7.56593017e-307],
   [1.24610383e-306, 1.24610723e-306, 1.37962320e-306,
   1.29060871e-306, 2.22522597e-306, 1.33511969e-306],
   [1.78022342e-306, 1.05700345e-307, 1.00132653e-307,
   8.01097889e-307, 1.78020169e-306, 7.56601165e-307],
   [1.02359984e-306, 1.15710088e-306, 6.23056330e-307,
   9.34604358e-307, 8.34449806e-308, 3.91792476e-317]])
```

```
In [34]: emp_like = np.empty_like(lspace)
```

```
In [35]: emp_like
```

```
Out[35]: array([1.          , 2.33333333, 3.66666667, 5.          ])
```

```
In [ ]: |
```

The screenshot shows a Jupyter Notebook interface running on a Windows operating system. The title bar indicates the browser is Google Chrome, and the address bar shows the URL is `localhost:8888/notebooks/Numpy%20Tutorial.ipynb`. The notebook has two tabs open: "Numpy Tutorial" and "Array creation — NumPy v1.16".

The main content area displays a Python code cell (In [36]) containing the command `ide = np.identity(4)`. Below it, another cell (In [37]) shows the output of this command, which is a 4x4 identity matrix represented as a NumPy array:

```
Out[37]: array([[1., 0., 0., ...],  
                 [0., 1., 0., ...],  
                 [0., 0., 1., ...],  
                 ...,  
                 [0., 0., 0., ...],  
                 [0., 0., 0., ...],  
                 [0., 0., 0., ...]])
```

A third code cell (In []) is currently active, showing the partially typed command `ide.|`, indicating the user is in the process of writing further code.

The screenshot shows a Jupyter Notebook interface running on a Windows operating system. The title bar of the browser window displays multiple tabs: "download python - Google Search", "Download Python | Python.org", "Home", "Numpy Tutorial", and "Array creation — NumPy v1.16". Below the title bar, the taskbar shows icons for "Apps", "YouTube", "Gmail", "CodeWithHarry - Y...", "C Language Tutoria...", and "ProgrammingWith...".

The Jupyter Notebook window has a header with the logo, the title "jupyter Numpy Tutorial (unsaved changes)", a Python logo icon, and a "Logout" button. The menu bar includes File, Edit, View, Insert, Cell, Kernel, Widgets, and Help. The toolbar below the menu bar contains icons for file operations like save, new, and run, along with a "Code" dropdown and a keyboard icon.

The main content area displays the following code and its output:

```
[0., 0., 0., ..., 0., 1., 0.],  
[0., 0., 0., ..., 0., 0., 1.]])
```

```
In [38]: ide.shape  
Out[38]: (45, 45)
```

```
In [39]: arr = np.arange(99)
```

```
In [40]: arr  
Out[40]: array([ 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16,  
    17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33,  
    34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50,  
    51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67,  
    68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84,  
    85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98])
```

```
In [ ]: |
```

The screenshot shows a Jupyter Notebook interface running in a web browser. The title bar indicates the window is titled "Numpy Tutorial". The browser tabs include "download python - Google Search", "Download Python | Python.org", "Home", "Numpy Tutorial", and "Array creation — NumPy v1.16". The Jupyter header bar includes "File", "Edit", "View", "Insert", "Cell", "Kernel", "Widgets", and "Help" menus, along with "Trusted" and "Python 3" status indicators. Below the header is a toolbar with icons for file operations (Save, New, Open, etc.), cell selection (Run, Cell, Cell Block), and code execution (Code). The main content area displays a cell labeled "In [41]:" containing the command `arr.reshape(3, 33)`. The output "Out[41]" shows a 3x33 array of integers from 0 to 98. A new input cell "In []:" is visible at the bottom.

```
In [41]: arr.reshape(3, 33)

Out[41]: array([[ 0,  1,  2,  3,  4,  5,  6,  7,  8,  9, 10, 11, 12, 13, 14, 15,
       16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31,
       32],
       [33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48,
       49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64,
       65],
       [66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81,
       82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97,
       98]])
```

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In [42]: `arr.reshape(3, 31)`

```
-----  
ValueError Traceback (most recent call last)  
<ipython-input-42-ca2ed8453b83> in <module>  
----> 1 arr.reshape(3, 31)  
  
ValueError: cannot reshape array of size 99 into shape (3,31)
```

In [49]: `arr.ravel()`

Out[49]: `array([0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16,`
 `17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33,`
 `34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48,`
 `49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64,`
 `65],`
`[66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81,`
 `82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97,`
 `98])`

In []: `arr.`

Jupyter Numpy Tutorial (unsaved changes)

File Edit View Insert Cell Kernel Widgets Help Trusted Python 3

In [51]: `arr = arr.ravel()`

In [52]: `arr.shape`

Out[52]: `(99,)`

In []:

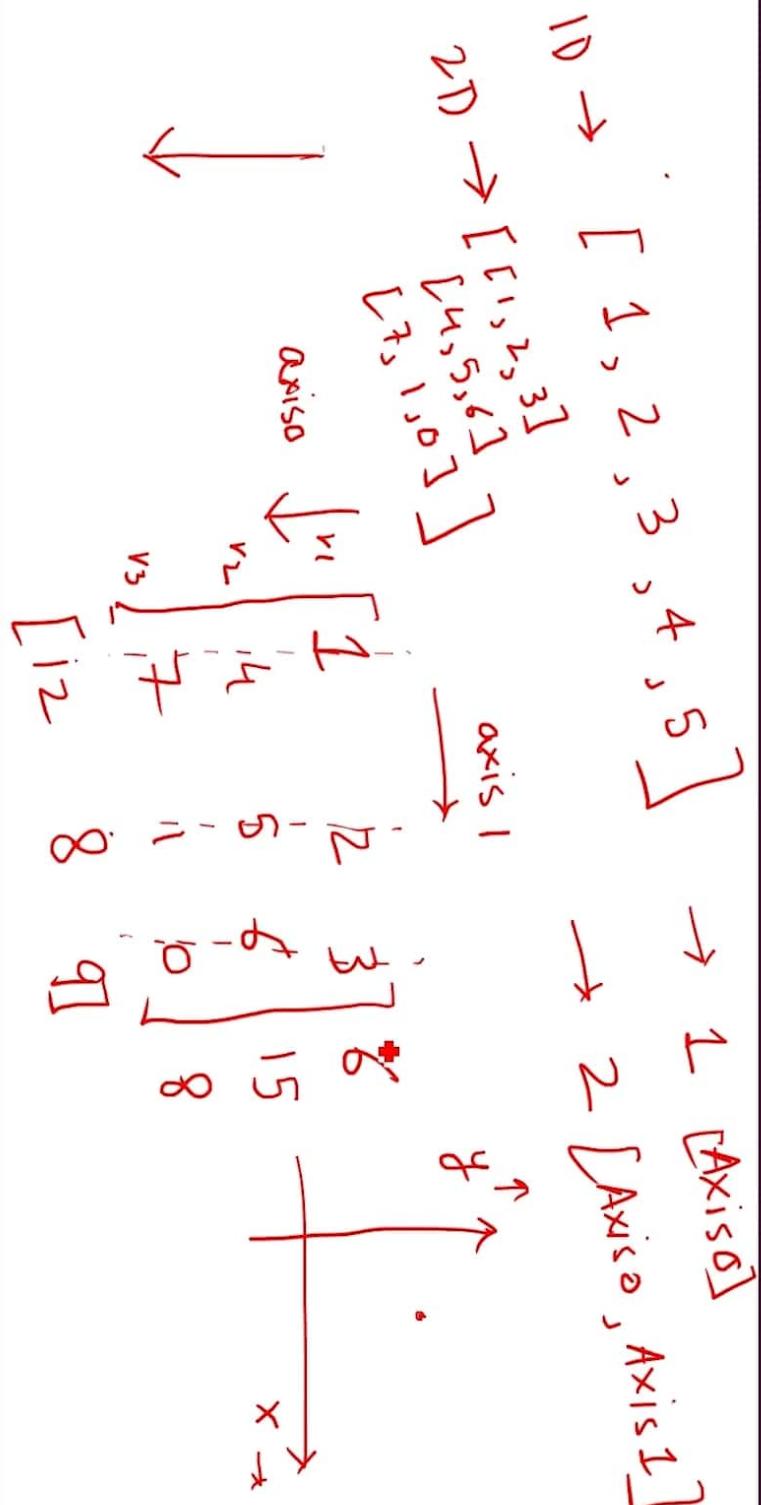
NUMPY AXIS

1D → [1, 2, 3, 4, 5] → 1 [Axis 0]

→ 2 [Axis 0, Axis 1]

2D →

NUMPY AXIS



NUMPY AXIS

1D → [1, 2, 3, 4, 5] → 1 [Axis 0]
2D → [[1, 2, 3],
 [4, 5, 6],
 [7, 8, 0]] → 2 [Axis 0, Axis 1]

axis 1
↓
axis 0

↓ r₁ ↓ r₂ ↓ r₃

1 2 3 6
4 5 6 15
7 8 0 8
[12 8 9]

↑ y
↑ .
x →

The screenshot shows a Jupyter Notebook interface running on a Windows operating system. The title bar indicates the browser is Google Chrome, and the address bar shows the URL is `localhost:8888/notebooks/Numpy%20Tutorial.ipynb`. The notebook has tabs for 'Numpy Tutorial' and 'Array creation — NumPy v1.16'. The main content area displays a NumPy tutorial. The toolbar includes File, Edit, View, Insert, Cell, Kernel, Widgets, Help, Trusted, Python 3, and various cell management icons. The code cells show:

```
In [52]: arr.shape  
Out[52]: (99,)  
  
In [53]: x = [[1,2,3], [4,5,6],[7,1,0]]  
  
In [54]: ar = np.array(x)  
  
In [55]: ar  
Out[55]: array([[1, 2, 3],  
                 [4, 5, 6],  
                 [7, 1, 0]])
```

The input cell at the bottom is currently empty, indicated by the placeholder 'In []:'.

The screenshot shows a Jupyter Notebook interface running on a Windows operating system. The browser tab title is "Array creation — NumPy v1.16". The notebook title is "Numpy Tutorial" and it shows an unsaved changes indicator. The toolbar includes File, Edit, View, Insert, Cell, Kernel, Widgets, Help, Trusted status (unchecked), and Python 3 kernel selection. Below the toolbar are standard Jupyter notebook controls for file operations (Save, New, Delete, etc.), cell navigation (Up, Down, Run), and code completion.

In [54]: `ar = np.array(x)`

In [55]: `ar`

Out[55]: `array([[1, 2, 3],
 [4, 5, 6],
 [7, 1, 0]])`

In [56]: `ar.sum(axis=0)`

Out[56]: `array([12, 8, 9])`

In []:

The taskbar at the bottom shows the Windows Start button, a search bar, and pinned application icons for File Explorer, Google Chrome, Microsoft Edge, and others. The system tray shows network, battery, and volume status.

The screenshot shows a Jupyter Notebook interface running on a Windows operating system. The title bar indicates the notebook is titled "Numpy Tutorial" and is currently unsaved. The toolbar includes standard file operations like Save, New, and Open, along with Run, Kernel, and Help buttons. The main workspace displays a series of code cells and their corresponding outputs:

```
Out[55]: array([[1, 2, 3],  
                 [4, 5, 6],  
                 [7, 1, 0]])  
  
In [56]: ar.sum(axis=0)  
Out[56]: array([12, 8, 9])  
  
In [58]: ar.sum(axis=1)  
Out[58]: array([ 6, 15, 8])  
  
In [ ]:
```

The taskbar at the bottom shows various pinned icons, including Google Chrome, File Explorer, and the Start button.

download python - Google Search | Download Python | Python.org | Home | Numpy Tutorial | Array creation — NumPy v1.16 | +

localhost:8888/notebooks/Numpy%20Tutorial.ipynb

Logout

jupyter Numpy Tutorial (unsaved changes)

File Edit View Insert Cell Kernel Widgets Help Trusted Python 3

Out[55]: array([[1, 2, 3],
[4, 5, 6],
[7, 1, 0]])

In [56]: ar.sum(axis=0)

Out[56]: array([12, 8, 9])

In [58]: ar.sum(axis=1)

Out[58]: array([6, 15, 8])

In [59]: ar.T

Out[59]: array([[1, 4, 7],
[2, 5, 1],
[3, 6, 0]])

In []:

The screenshot shows a Jupyter Notebook interface running on a Windows operating system. The title bar indicates the browser is Google Chrome, and the address bar shows the URL is `localhost:8888/notebooks/Numpy%20Tutorial.ipynb`. The notebook has two tabs open: "Numpy Tutorial" and "Array creation — NumPy v1.16". The "Numpy Tutorial" tab is active.

The notebook interface includes a toolbar with icons for file operations, cell creation, and execution. The menu bar offers options like File, Edit, View, Insert, Cell, Kernel, Widgets, and Help. A status bar at the bottom shows the Python version as "Python 3".

The main workspace displays the following code and output:

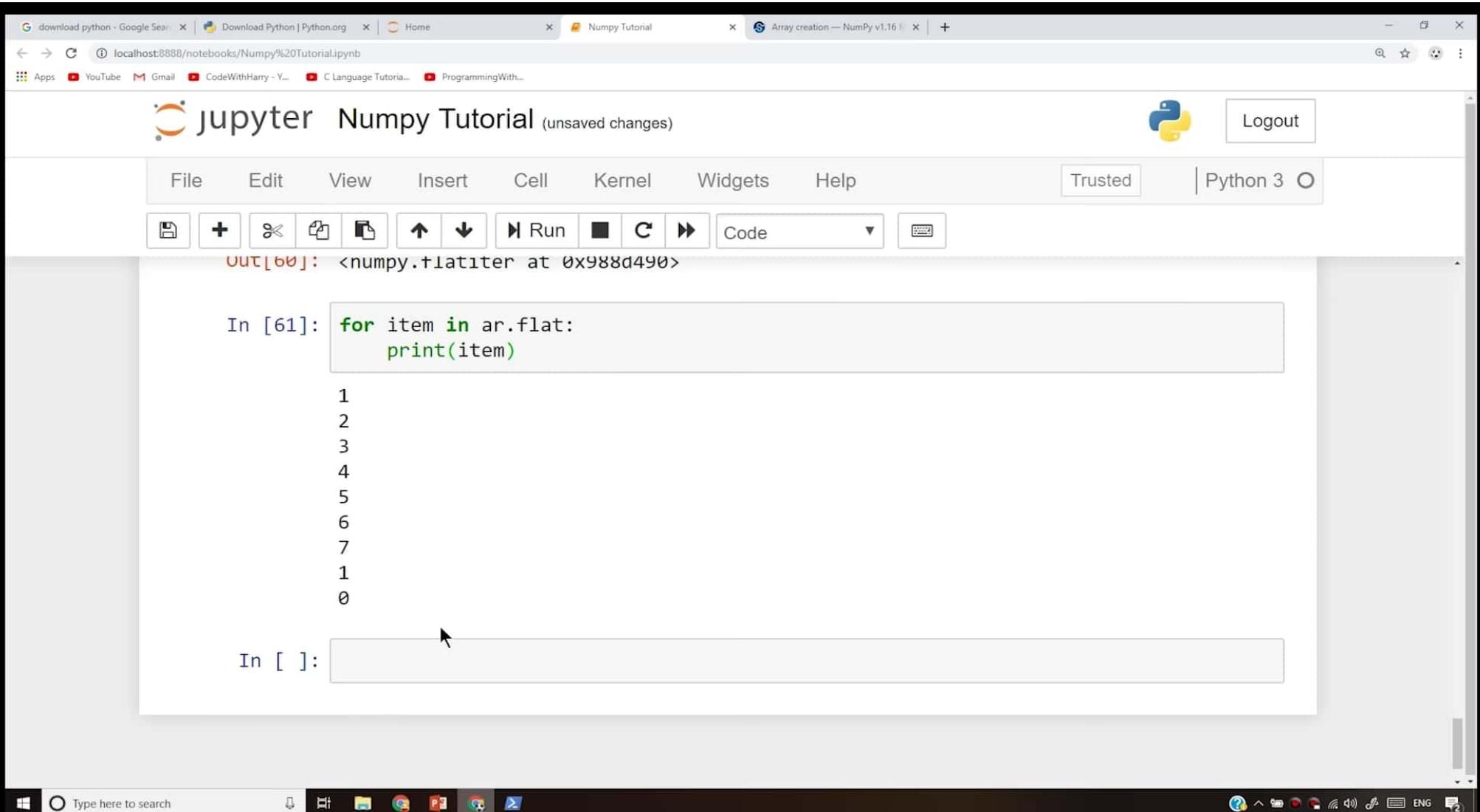
```
Out[59]: array([[1, 4, 7],  
                 [2, 5, 1],  
                 [3, 6, 0]])
```

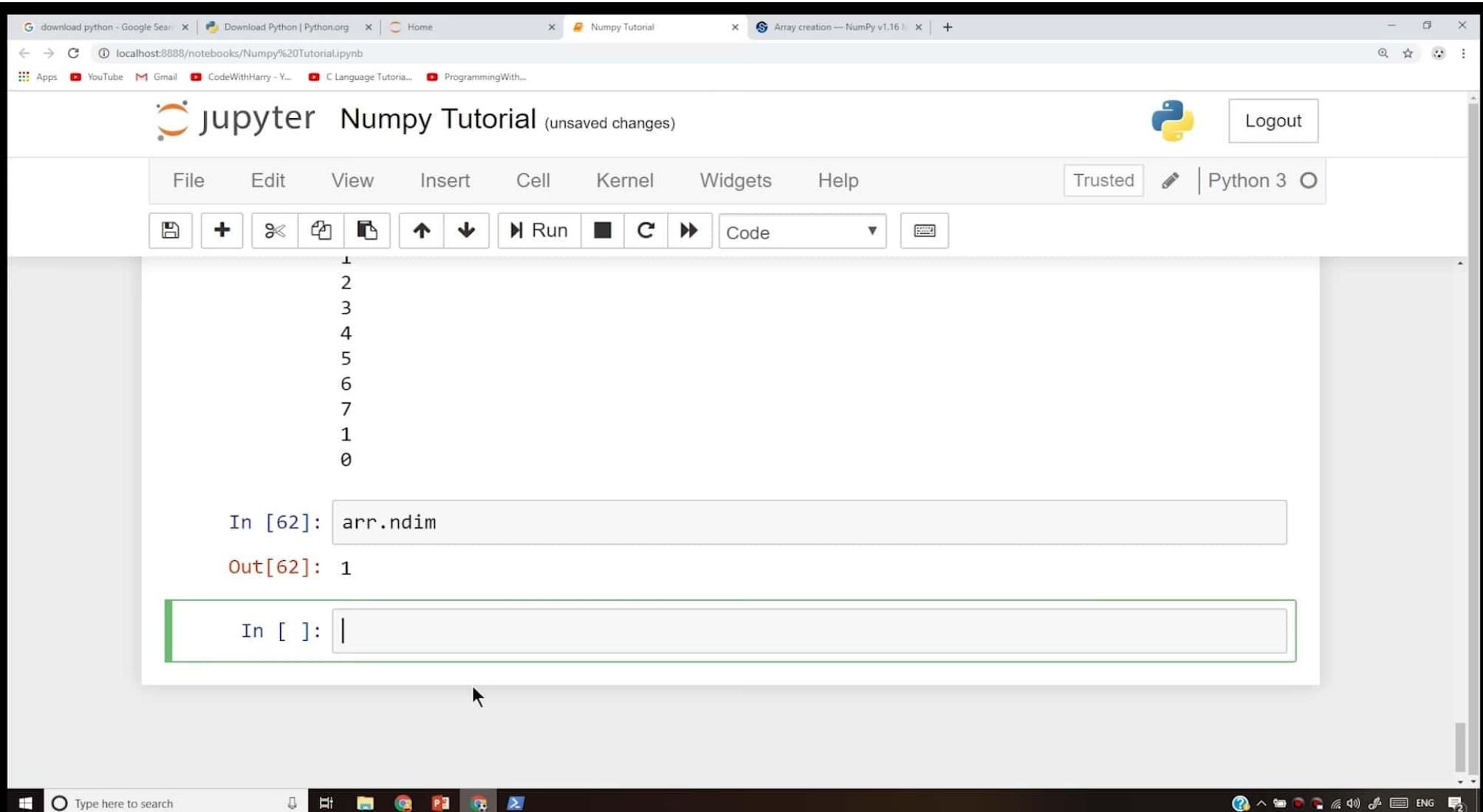
```
In [60]: ar.flat
```

```
Out[60]: <numpy.flatiter at 0x988d490>
```

```
In [61]: for item in ar.flat:  
         print(item)
```

```
1  
2  
3  
4  
5  
6  
7  
1  
0
```





The screenshot shows a Jupyter Notebook interface running on a Windows operating system. The browser tab title is "Array creation — NumPy v1.16". The notebook title is "Numpy Tutorial" and it has "(unsaved changes)" indicated. The Python kernel is set to "Python 3". The toolbar includes standard file operations like Save, New, and Run, along with a Code dropdown and a keyboard icon.

In [65]: ar.ndim

Out[65]: 2

In [66]: ar.size

Out[66]: 9

In [67]: ar nbytes

Out[67]: 36

In []:

The screenshot shows a Jupyter Notebook interface running on a Windows operating system. The title bar of the browser window indicates the URL is `localhost:8888/notebooks/Numpy%20Tutorial.ipynb`. The notebook itself is titled "Numpy Tutorial" and shows several code cells and their outputs:

- In [66]:** `9`
- In [67]:** `ar nbytes`
Out[67]: `36`
- In [68]:** `one = np.array([1,3,4,634,2])`
- In [69]:** `one.argmax()`
Out[69]: `3`
- In []:** (This cell is currently empty.)

The Jupyter interface includes a toolbar with various icons for file operations, cell selection, and execution. The status bar at the bottom shows the Windows taskbar with icons for File Explorer, Google Chrome, and other applications.

The screenshot shows a Jupyter Notebook interface running on a Windows operating system. The title bar indicates the notebook is titled "Numpy Tutorial". The menu bar includes File, Edit, View, Insert, Cell, Kernel, Widgets, Help, and a status bar showing "Notebook saved", "Trusted", and "Python 3". The toolbar below the menu contains icons for file operations like save, new, and run, along with a dropdown for cell type.

In [67]: ar nbytes

Out[67]: 36

In [68]: one = np.array([1, 3, 4, 634, 2])

In [69]: one.argmax()

Out[69]: 3

In [70]: one.argmin()

Out[70]: 0

In [71]: one.argsort()

Out[71]: array([0, 4, 1, 2, 3], dtype=int32)

In []:

The taskbar at the bottom shows the Windows Start button, a search bar, and pinned icons for File Explorer, Google Chrome, and others. The system tray shows network, battery, and language status.

The screenshot shows a Jupyter Notebook interface running on a Windows operating system. The title bar of the browser window indicates the page is "Array creation — NumPy v1.16". The notebook itself is titled "Numpy Tutorial" and shows several code cells and their outputs:

- In [66]:** `9`
- In [67]:** `ar nbytes`
- Out[67]:** `36`
- In [68]:** `one = np.array([1,3,4,634,2])`
- In [69]:** `one.argmax()`
- Out[69]:** `3`
- In []:** (This cell is currently empty.)

The Jupyter interface includes a toolbar with various icons for file operations, cell selection, and execution. The status bar at the bottom shows the Windows taskbar with icons for search, file explorer, and other applications.

The screenshot shows a Jupyter Notebook interface running on a Windows operating system. The title bar of the browser window displays multiple tabs, including "download python - Google Search", "Download Python | Python.org", "Home", "Numpy Tutorial", and "Array creation — NumPy v1.16.1". Below the title bar, the address bar shows the URL "localhost:8888/notebooks/Numpy%20Tutorial.ipynb". The main content area is titled "jupyter Numpy Tutorial (unsaved changes)". The toolbar contains standard menu items (File, Edit, View, Insert, Cell, Kernel, Widgets, Help) and a language selector set to "Python 3". Below the toolbar is a toolbar with various icons for file operations like saving, opening, and running cells. The notebook cells show the following code and output:

```
Out[67]: 36

In [68]: one = np.array([1,3,4,634,2])

In [69]: one.argmax()

Out[69]: 3

In [70]: one.argmin()

Out[70]: 0

In [ ]:
```

The screenshot shows a Jupyter Notebook interface running in a browser window. The title bar of the browser window reads "Numpy Tutorial". The notebook itself has a title "Numpy Tutorial (autosaved)". The toolbar includes standard options like File, Edit, View, Insert, Cell, Kernel, Widgets, and Help, along with a Python 3 kernel selector. Below the toolbar is a toolbar with various icons for file operations, cell selection, and execution.

In [67]: ar nbytes

Out[67]: 36

In [68]: one = np.array([1,3,4,634,2])

In [69]: one.argmax()

Out[69]: 3

In [70]: one.argmin()

Out[70]: 0

In [71]: one.argsort()

Out[71]: array([0, 4, 1, 2, 3], dtype=int32)

In []:

The screenshot shows a Jupyter Notebook interface running on a Windows operating system. The title bar indicates the notebook is titled "Numpy Tutorial". The menu bar includes File, Edit, View, Insert, Cell, Kernel, Widgets, and Help. A toolbar below the menu bar contains icons for file operations like Open, Save, and Run, along with a "Code" dropdown and a keyboard icon.

The notebook displays the following code and output:

```
Out[71]: array([0, 4, 1, 2, 3], dtype=int32)

In [72]: ar

Out[72]: array([[1, 2, 3],
   [4, 5, 6],
   [7, 1, 0]])

In [74]: ar.argmin()

Out[74]: 8

In [75]: ar.argmax()

Out[75]: 6

In [ ]:
```

The screenshot shows a Jupyter Notebook interface running on a Windows operating system. The title bar of the browser window indicates the URL is `localhost:8888/notebooks/Numpy%20Tutorial.ipynb`. The notebook content displays a series of code snippets and their outputs related to NumPy array operations:

- In [72]: `ar`
- Out[72]: `array([[1, 2, 3],
[4, 5, 6],
[7, 1, 0]])`
- In [74]: `ar.argmin()`
- Out[74]: `8`
- In [75]: `ar.argmax()`
- Out[75]: `6`
- In [76]: `ar.argmax(axis=0)`
- Out[76]: `array([2, 1, 1], dtype=int32)`

The Jupyter interface includes a toolbar with various icons for file operations, cell execution, and kernel management. The status bar at the bottom shows the Windows taskbar with icons for File Explorer, Google Chrome, and other applications.

The screenshot shows a Jupyter Notebook interface running on a Windows operating system. The title bar indicates the notebook is titled "Numpy Tutorial". The toolbar includes standard options like File, Edit, View, Insert, Cell, Kernel, Widgets, and Help, along with a "Trusted" button and a Python 3 kernel selection. Below the toolbar is a toolbar with icons for file operations (Save, New, Open, etc.), cell navigation (Up, Down), and execution (Run, Kernel Restart). The main area displays three code cells:

- In [75]: `ar.argmax()`
Out[75]: 6
- In [76]: `ar.argmax(axis=0)`
Out[76]: array([2, 1, 1], dtype=int32)
- In [77]: `ar.argmax(axis=1)`
Out[77]: array([2, 2, 0], dtype=int32)

A new cell, In []:, is currently active and ready for input, indicated by a green border around its input field.

The screenshot shows a Jupyter Notebook interface running on a Windows operating system. The browser tab bar at the top includes links for Google Search, Python.org, Home, Numpy Tutorial, and Array creation — NumPy v1.16. The Jupyter window title is "jupyter Numpy Tutorial (unsaved changes)". The toolbar contains standard file operations (File, Edit, View, Insert, Cell, Kernel, Widgets, Help), a Trusted status indicator, and a Python 3 kernel selection. Below the toolbar is a toolbar with icons for file operations like save, new, and copy, and cell controls like run, execute in parallel, and cell type.

In [76]: `ar.argmax(axis=0)`

Out[76]: `array([2, 1, 1], dtype=int32)`

In [77]: `ar.argmax(axis=1)`

Out[77]: `array([2, 2, 0], dtype=int32)`

In [78]: `ar.argsort(axis=1)`

Out[78]: `array([[0, 1, 2],
 [0, 1, 2],
 [2, 1, 0]], dtype=int32)`

In []:

The bottom taskbar shows the Windows Start button, a search bar, and pinned application icons for File Explorer, Google Chrome, Microsoft Edge, and FileZilla. The system tray icons include volume, network, battery, and language settings.

The screenshot shows a Jupyter Notebook interface running in a browser window. The title bar indicates the notebook is titled "Numpy Tutorial" and has "unsaved changes". The toolbar includes standard file operations like Save, New, and Run, along with kernel selection for Python 3. The main area displays the following code and its output:

```
[0, 1, 2],  
[2, 1, 0]], dtype=int32)  
  
In [79]: ar.argsort(axis=0)  
Out[79]: array([[0, 2, 2],  
                 [1, 0, 0],  
                 [2, 1, 1]], dtype=int32)  
  
In [80]: ar.ravel()  
Out[80]: array([1, 2, 3, 4, 5, 6, 7, 1, 0])  
  
In [ ]: ar.reshape(
```

The input cell at the bottom, containing "ar.reshape()", is highlighted with a green border. The browser's address bar shows the URL "localhost:8888/notebooks/Numpy%20Tutorial.ipynb". The taskbar at the bottom of the screen shows various open applications.

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localhost:8888/notebooks/Numpy%20Tutorial.ipynb

Logout

jupyter Numpy Tutorial (unsaved changes)

File Edit View Insert Cell Kernel Widgets Help Trusted Python 3

Out[80]: array([1, 2, 3, 4, 5, 6, 7, 1, 0])

In [81]: ar.reshape(9,1)

Out[81]: array([[1],
[2],
[3],
[4],
[5],
[6],
[7],
[1],
[0]])

In []:

The screenshot shows a Jupyter Notebook interface running on a Windows operating system. The title bar indicates the notebook is titled "Numpy Tutorial". The menu bar includes File, Edit, View, Insert, Cell, Kernel, Widgets, and Help. The toolbar features icons for file operations like save, new, and run, along with a "Code" dropdown and keyboard shortcut keys.

The notebook contains the following code and output:

```
In [84]: ar
Out[84]: array([[1, 2, 3],
               [4, 5, 6],
               [7, 1, 0]])

In [85]: ar2 = np.array([[1, 2, 1],
                      [4, 0, 6],
                      [8, 1, 0]])
Out[85]: array([[1, 2, 1],
               [4, 0, 6],
               [8, 1, 0]])

In [86]: ar + ar2
Out[86]: array([[ 2,  4,  4],
               [ 8,  5, 12],
               [15,  2,  0]])
```

The bottom input cell (In []:) is currently empty, indicated by a vertical cursor line.

The screenshot shows a Jupyter Notebook interface running on a Windows operating system. The title bar indicates the notebook is titled "Numpy Tutorial". The menu bar includes File, Edit, View, Insert, Cell, Kernel, Widgets, and Help. A toolbar below the menu bar contains icons for file operations like save, new, and run, along with a "Code" dropdown and a keyboard icon.

The notebook displays the following code and output:

```
Out[84]: array([[1, 2, 3],
   [4, 5, 6],
   [7, 1, 0]])
```

```
In [85]: ar2 = np.array([[1, 2, 1],
   [4, 0, 6],
   [8, 1, 0]])
```

```
In [86]: ar + ar2
```

```
Out[86]: array([[ 2,  4,  4],
   [ 8,  5, 12],
   [15,  2,  0]])
```

```
In [87]: [324, 34] + [34, 546]
```

```
Out[87]: [324, 34, 34, 546]
```

The bottom of the window shows the Windows taskbar with the Start button, a search bar, and pinned application icons for File Explorer, Google Chrome, and others. The system tray shows network, battery, and volume status.

The screenshot shows a Jupyter Notebook interface running on a Windows operating system. The title bar indicates the window is titled "Numpy Tutorial". The menu bar includes File, Edit, View, Insert, Cell, Kernel, Widgets, and Help. A toolbar below the menu bar contains icons for file operations like save, new, and delete, along with run, cell selection, and code execution buttons. The main workspace displays a series of code cells and their outputs:

```
Out[86]: array([[ 2,  4,  4],
   [ 8,  5, 12],
   [15,  2,  0]])
```

```
In [87]: [324, 34] + [34, 546]
```

```
Out[87]: [324, 34, 34, 546]
```

```
In [88]: ar * ar2
```

```
Out[88]: array([[ 1,  4,  3],
   [16,  0, 36],
   [56,  1,  0]])
```

```
In [ ]:
```

The screenshot shows a Jupyter Notebook interface running on a Windows operating system. The title bar indicates the window is titled "Numpy Tutorial". The notebook has tabs for "File", "Edit", "View", "Insert", "Cell", "Kernel", "Widgets", and "Help". A toolbar below the menu bar includes icons for file operations, cell selection, and run. The main workspace displays the following code and output:

```
In [90]: ar2
Out[90]: array([[1, 2, 1],
   [4, 0, 6],
   [8, 1, 0]])

In [91]: ar*ar2
Out[91]: array([[ 1,  4,  3],
   [16,  0, 36],
   [56,  1,  0]])
```

The input cell In []: is currently active, indicated by a green border around its input field.

The screenshot shows a Jupyter Notebook interface running on a Windows operating system. The browser tab title is "Array creation — NumPy v1.16". The notebook title is "Numpy Tutorial" and it has "(unsaved changes)" in parentheses. The toolbar includes File, Edit, View, Insert, Cell, Kernel, Widgets, Help, Trusted, Python 3, and Logout. Below the toolbar are standard Jupyter notebook icons for file operations, cell selection, and execution.

```
[4, 5, 6],  
[7, 1, 0]])  
  
In [90]: ar2  
  
Out[90]: array([[1, 2, 1],  
                 [4, 0, 6],  
                 [8, 1, 0]])  
  
In [91]: ar*ar2  
  
Out[91]: array([[ 1,  4,  3],  
                 [16,  0, 36],  
                 [56,  1,  0]])  
  
In [92]: np.sqrt(ar)  
  
Out[92]: array([[1.          , 1.41421356, 1.73205081],  
                 [2.          , 2.23606798, 2.44948974],  
                 [2.64575131, 1.          , 0.          ]])
```

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localhost:8888/notebooks/Numpy%20Tutorial.ipynb

Logout

jupyter Numpy Tutorial (unsaved changes)

File Edit View Insert Cell Kernel Widgets Help Trusted Python 3

Out[92]: array([[1. , 1.41421356, 1.73205081],
 [2. , 2.23606798, 2.44948974],
 [2.64575131, 1. , 0.]])

In [93]: ar.sum()

Out[93]: 29

In [94]: ar.max()

Out[94]: 7

In []: ar.|

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localhost:8888/notebooks/Numpy%20Tutorial.ipynb

Logout

jupyter Numpy Tutorial (unsaved changes)

File Edit View Insert Cell Kernel Widgets Help Trusted Python 3

In [95]: `0`

Out[95]: `0`

In [96]: `ar`

Out[96]: `array([[1, 2, 3],
[4, 5, 6],
[7, 1, 0]])`

In [97]: `np.where(ar>5)`

Out[97]: `(array([1, 2], dtype=int32), array([2, 0], dtype=int32))`

In []:

The screenshot shows a Jupyter Notebook interface running on a Windows operating system. The title bar indicates the notebook is titled "Numpy Tutorial" and is currently unsaved. The menu bar includes File, Edit, View, Insert, Cell, Kernel, Widgets, and Help. A toolbar below the menu bar contains icons for file operations like save, new, and run, along with a "Code" dropdown and keyboard shortcut keys. The main workspace displays the following code and output:

```
In [95]: 0
Out[95]: 0

In [96]: ar
Out[96]: array([[1, 2, 3],
       [4, 5, 6],
       [7, 1, 0]])

In [97]: np.where(ar>5)
Out[97]: (array([1, 2], dtype=int32), array([2, 0], dtype=int32))

In [ ]:
```

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localhost:8888/notebooks/Numpy%20Tutorial.ipynb

Logout

File Edit View Insert Cell Kernel Widgets Help Trusted Python 3

Out[95]: 0

In [96]: ar

Out[96]: array([[1, 2, 3],
[4, 5, 6],
[7, 1, 0]])

In [98]: np.where(ar>5)

Out[98]: tuple

In []:

The screenshot shows a Jupyter Notebook interface running on a Windows operating system. The title bar of the browser window displays multiple tabs, including "download python - Google Search", "Download Python | Python.org", "Home", "Numpy Tutorial", and "Array creation — NumPy v1.16". Below the title bar, the address bar shows the URL "localhost:8888/notebooks/Numpy%20Tutorial.ipynb". The Jupyter interface includes a header with the "jupyter" logo, the title "Numpy Tutorial (unsaved changes)", a Python logo icon, and a "Logout" button. The menu bar offers options like File, Edit, View, Insert, Cell, Kernel, Widgets, and Help. A toolbar below the menu bar contains icons for file operations (Save, New, Open, etc.), cell selection, and execution (Run, Cell, Kernel). The main workspace displays a series of code cells and their outputs:

```
Out[96]: array([[1, 2, 3],  
                 [4, 5, 6],  
                 [7, 1, 0]])  
  
In [99]: np.where(ar>5)  
  
Out[99]: (array([1, 2], dtype=int32), array([2, 0], dtype=int32))  
  
In [100]: np.count_nonzero(ar)  
  
Out[100]: 8  
  
In [ ]:
```

The screenshot shows a Jupyter Notebook interface running on a Windows operating system. The title bar indicates the window is titled "Numpy Tutorial". The menu bar includes File, Edit, View, Insert, Cell, Kernel, Widgets, and Help. A toolbar below the menu bar contains icons for saving, running, and other operations. The main area displays a series of code cells and their outputs:

- In [96]: ar
- Out[96]: array([[1, 2, 3],
[4, 5, 6],
[7, 1, 0]])
- In [99]: np.where(ar>5)
- Out[99]: (array([1, 2], dtype=int32), array([2, 0], dtype=int32))
- In [100]: np.count_nonzero(ar)
- Out[100]: 8
- In [101]: np.nonzero(ar)
- Out[101]: (array([0, 0, 0, 1, 1, 1, 2, 2], dtype=int32),
array([0, 1, 2, 0, 1, 2, 0, 1], dtype=int32))

The taskbar at the bottom shows various pinned application icons, including File Explorer, Google Chrome, Microsoft Edge, and others.

Jupyter Numpy Tutorial (unsaved changes)

File Edit View Insert Cell Kernel Widgets Help Trusted Python 3

In [103]: `np.nonzero(ar)`

Out[103]: `(array([0, 0, 0, 1, 1, 2, 2], dtype=int32), array([0, 1, 2, 0, 1, 0, 1], dtype=int32))`

In [104]: `import sys`

In [106]: `py_ar = [0,4,55,2]`

In [107]: `np_ar = np.array(py_ar)`

In []:

The screenshot shows a Jupyter Notebook interface running in a web browser. The title bar indicates the notebook is titled "Numpy Tutorial". The toolbar includes standard options like File, Edit, View, Insert, Cell, Kernel, Widgets, and Help, along with a "Trusted" button and a Python 3 kernel selection. Below the toolbar is a toolbar with icons for file operations (Save, New, Open, etc.) and cell execution (Run, Cell, Code). The main area displays a code cell with the following Python code:

```
array([0, 1, 2, 0, 1, 0, 1], dtype=int32)
```

Below this, several previous code cells are shown:

```
In [104]: import sys
```

```
In [106]: py_ar = [0,4,55,2]
```

```
In [107]: np_ar = np.array(py_ar)
```

```
In [108]: sys.getsizeof(1) * len(py_ar)
```

```
Out[108]: 56
```

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An associated data-type object describes the format of each element in the **array** (its byte-order, how many bytes it occupies in memory, whether it is an integer, a floating point number, or something else, etc.) ... For more information, refer to the **numpy** module and examine the **methods and attributes** of an **array**.

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class **numpy.ndarray** (shape, dtype=float, buffer=None, offset=0, strides=None ... refer to the **numpy** module and examine the **methods and attributes** of an **array**.

The N-dimensional array (ndarray) — NumPy v1.16 Manual
<https://docs.scipy.org/doc/numpy/reference/arrays.ndarray.html>

an **ndarray** can be accessed and modified by indexing or slicing the **array** (using, for example, N

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the rear part of the array.

size : int
Number of elements in the array.

itemsize : int
Length of one array element in bytes.

nbytes : int
Total bytes consumed by the elements of the array.

ndim : int
Number of array dimensions.

shape : tuple of ints
Tuple of array dimensions.

strides : tuple of ints
Tuple of bytes to step in each dimension when traversing an array.

ctypes : ctypes object
An object to simplify the interaction of the array with the `ctypes` module.

base : ndarray
Base object if memory is from some other object.

Methods

<code>all([axis, out, keepdims])</code>	Returns True if all elements evaluate to True.
<code>any([axis, out, keepdims])</code>	Returns True if any of the elements of <code>a</code> evaluate to True.
<code>argmax([axis, out])</code>	Return indices of the maximum values along the given axis.
<code>argmin([axis, out])</code>	Return indices of the minimum values along the given axis of <code>a</code> .
<code>argpartition(kth[, axis, kind, order])</code>	Returns the indices that would partition this array.
<code>argsort([axis, kind, order])</code>	Returns the indices that would sort this array.
<code>astype(dtype[, order, casting, subok, copy])</code>	Copy of the array, cast to a specified type.
<code>byteswap([inplace])</code>	Swap the bytes of the array elements
<code>choose(choices[, out, mode])</code>	Use an index array to construct a new array from a set of choices.
<code>clip([min, max, out])</code>	Return an array whose values are limited to <code>[min, max]</code> .
<code>compress(condition[, axis, out])</code>	Return selected slices of this array along given axis.
<code>conj()</code>	Complex-conjugate all elements.
<code>conjugate()</code>	Return the complex conjugate, element-wise.
<code>copy([order])</code>	Return a copy of the array.
<code>cumprod([axis, dtype, out])</code>	Return the cumulative product of the elements along the given axis.
<code>cumsum([axis, dtype, out])</code>	Return the cumulative sum of the elements along the given axis.
<code>diagonal([offset, axis1, axis2])</code>	Return specified diagonals.
<code>dot(b[, out])</code>	Dot product of two arrays.
<code>dummpy(file)</code>	Dump a pickle of the array to the specified file.

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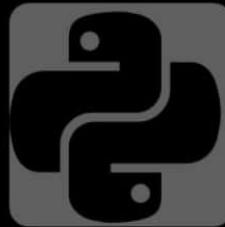
<code>dumps()</code>	Returns the pickle of the array as a string.
<code>fill(value)</code>	Fill the array with a scalar value.
<code>flatten([order])</code>	Return a copy of the array collapsed into one dimension.
<code>getfield(dtype[, offset])</code>	Returns a field of the given array as a certain type.
<code>item(*args)</code>	Copy an element of an array to a standard Python scalar and return it.
<code>itemset(*args)</code>	Insert scalar into an array (scalar is cast to array's dtype, if possible)
<code>max([axis, out, keepdims])</code>	Return the maximum along a given axis.
<code>mean([axis, dtype, out, keepdims])</code>	Returns the average of the array elements along given axis.
<code>min([axis, out, keepdims])</code>	Return the minimum along a given axis.
<code>newbyteorder([new_order])</code>	Return the array with the same data viewed with a different byte order.
<code>nonzero()</code>	Return the indices of the elements that are non-zero.
<code>partition(kth[, axis, kind, order])</code>	Rearranges the elements in the array in such a way that the value of the element in k th position is in the position it would be in a sorted array.
<code>prod([axis, dtype, out, keepdims])</code>	Return the product of the array elements over the given axis.
<code>ptp([axis, out, keepdims])</code>	Peak to peak (maximum - minimum) value along a given axis.
<code>put(indices, values[, mode])</code>	Set $a.flat[n] = \text{values}[n]$ for all n in indices.
<code>ravel([order])</code>	Return a flattened array.
<code>repeat(repeats[, axis])</code>	Repeat elements of an array.
<code>reshape(shape[, order])</code>	Returns an array containing the same data with a new shape.
<code>resize(new_shape[, refcheck])</code>	Change shape and size of array in-place.
<code>round([decimals, out])</code>	Return a with each element rounded to the given number of decimals.
<code>searchsorted(v[, side, sorter])</code>	Find indices where elements of v should be inserted in a to maintain order.
<code>setfield(val, dtype[, offset])</code>	Put a value into a specified place in a field defined by a data-type.
<code>setflags([write, align, uic])</code>	Set array flags WRITEABLE, ALIGNED, (WRITEBACKIFCOPY and UPDATEIFCOPY), respectively.
<code>sort([axis, kind, order])</code>	Sort an array, in-place.
<code>squeeze([axis])</code>	Remove single-dimensional entries from the shape of a .
<code>std([axis, dtype, out, ddof, keepdims])</code>	Returns the standard deviation of the array elements along given axis.
<code>sum([axis, dtype, out, keepdims])</code>	Return the sum of the array elements over the given axis.
<code>swapaxes(axis1, axis2)</code>	Return a view of the array with $axis1$ and $axis2$ interchanged.
<code>take(indices[, axis, out, mode])</code>	Return an array formed from the elements of a at the given indices.
<code>tobytes([order])</code>	Construct Python bytes containing the raw data bytes in the array.
<code>tofile(fid[, sep, format])</code>	Write array to a file as text or binary (default).
<code>tolist()</code>	Return the array as a (possibly nested) list.
<code>tostring([order])</code>	Construct Python bytes containing the raw data bytes in the array.
<code>trace([offset, axis1, axis2, dtype, out])</code>	Return the sum along diagonals of the array.
<code>transpose(*axes)</code>	Returns a view of the array with axes transposed.
<code>var([axis, dtype, out, ddof, keepdims])</code>	Returns the variance of the array elements, along given axis.
<code>view([dtype, type])</code>	New view of array with the same data.

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<https://docs.scipy.org/doc/numpy/reference/generated/numpy.ndarray.sort.html#numpy.ndarray.sort>

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14

Basic Plotting Using Matplotlib In Python

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