# Learning Outcome

After completing this module, the student should be able to install and different operation in python

To meet the learning outcome, a student has to complete the following activities

1. Install NumPy, pandas, matplotlib, Seaborn, sklearn in python 3
2. Creating arrays in NumPy
3. Creating multidimensional array in NumPy
4. Numpy Operations, methods and attributes
5. Numpy case studies
6. Understanding Pandas series and dataframe
7. Pandas ingestion of data from csv, json, html, excel, text files
8. Pandas functionalities for Series & Data Frames
9. Grouping, Merging, concatenating, joining, segregation

# Activity 1

**Aim:** Install NumPy, pandas, matplotlib, Seaborn, sklearn in python 3

**Learning outcome:** Able to install and different operation in python

**Duration:** 3.5 hour

**List of Hardware/Software requirements:**

1. Laptop/Computer with Windows 10/11
2. Internet connection
3. Python

**Program / Procedure :**

**Installing pandas in python 3.**

Installing with pip

It is a package installation manager that makes installing Python libraries and frameworks straightforward.

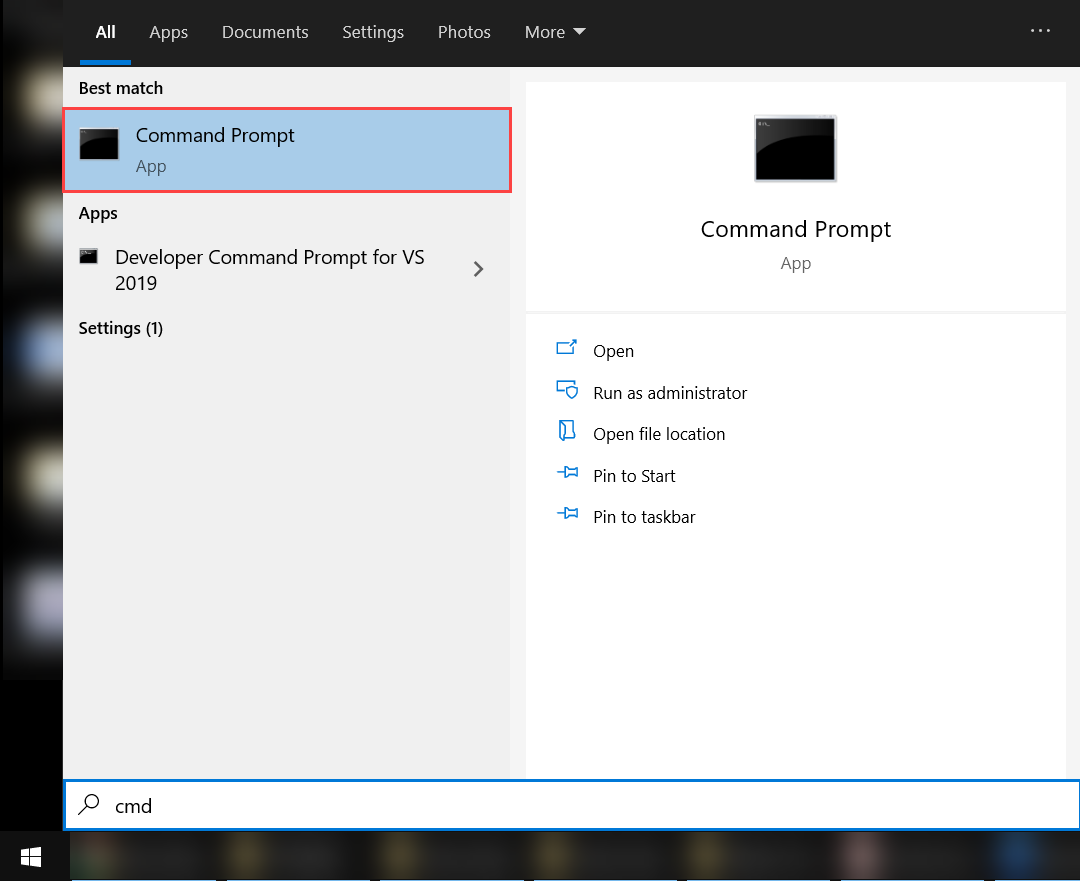
As long as you have a newer version of Python installed (> Python 3.4), pip will be installed on your computer along with Python by default.

However, if you’re using an older version of Python, you will need to install pip on your computer before installing Pandas. The easiest way to do this is to upgrade to the latest version of Python available on [https://www.python.org](https://www.python.org/).

Step #1: Launch Command Prompt

Press the Windows key on your keyboard or click on the Start button to open the start menu. Type “cmd,” and the Command Prompt app should appear as a listing in the start menu.

Open up the command prompt so you can install Pandas.

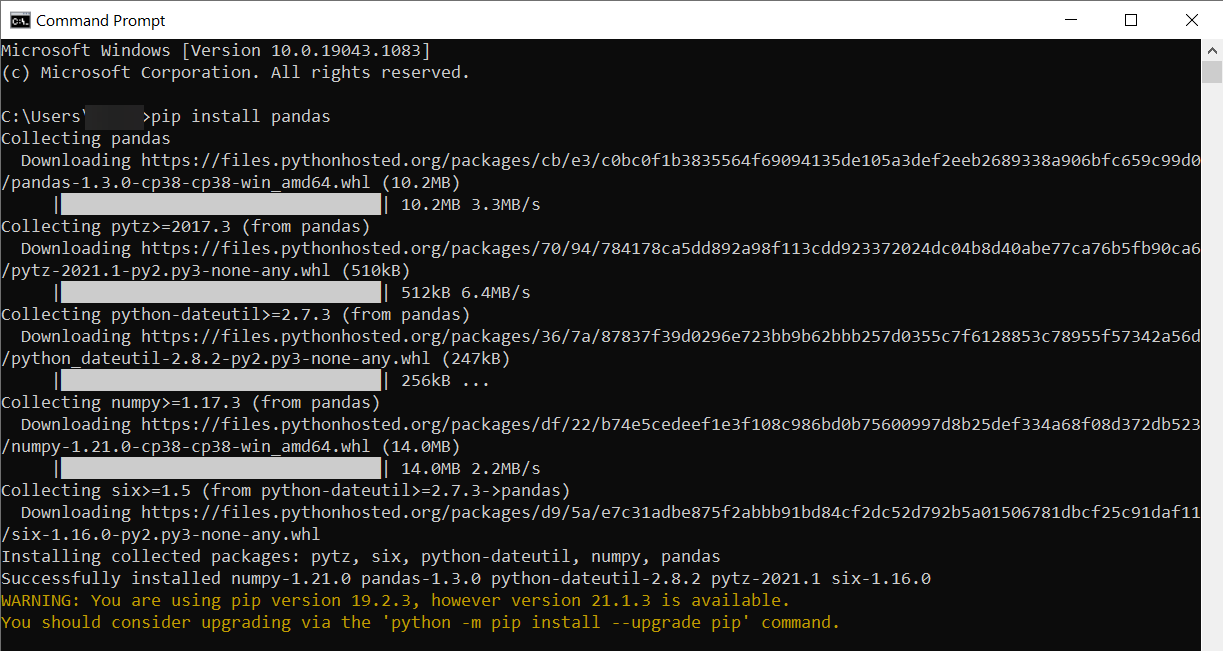
[](https://www.pythoncentral.io/wp-content/uploads/2021/07/Opening-Command-Prompt.png)

#### https://www.pythoncentral.io/wp-content/uploads/2021/07/Opening-Command-Prompt-768x626.png

#### Step #2: Enter the Required Command

After you launch the command prompt, the next step in the process is to type in the required command to initialize pip installation.

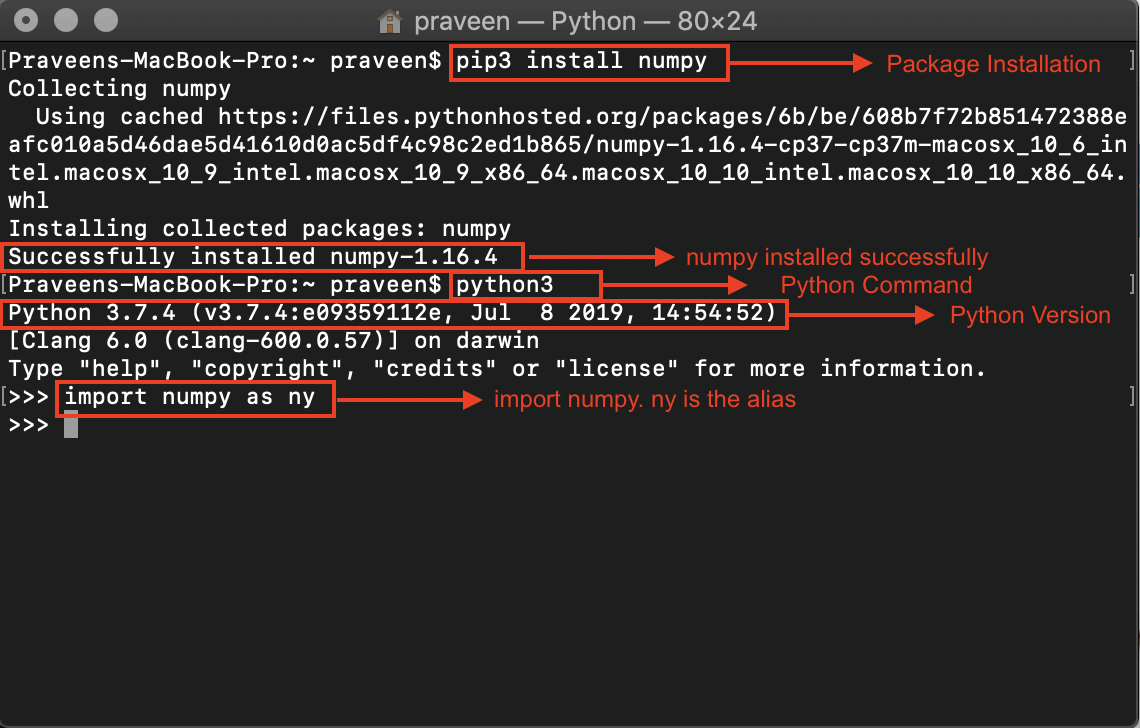
Enter the command “pip3 install pandas” on the terminal. This should launch the pip installer. The required files will be downloaded, and Pandas will be ready to run on your computer.

[](https://www.pythoncentral.io/wp-content/uploads/2021/07/Installing-Pandas-with-pip.png)

https://www.pythoncentral.io/wp-content/uploads/2021/07/Installing-Pandas-with-pip.png

After the installation is complete, you will be able to use Pandas in your Python programs.

Enter the command “pip3 install numpy” on the terminal. This should launch the pip installer. The required files will be downloaded, and numpy will be ready to run on your computer.



https://d1jnx9ba8s6j9r.cloudfront.net/blog/wp-content/uploads/2019/09/5Output-Numpy-installation-Edureka.png

After the installation is complete, you will be able to use numpy in your Python programs.

Matplotlib can be installed using pip. The following command is run in the command prompt to install Matplotlib.

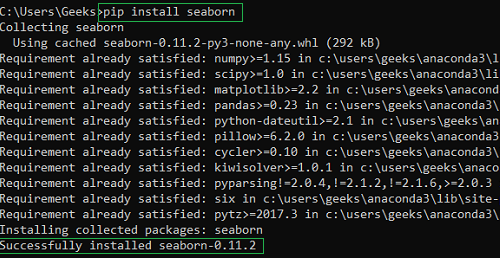
pip install matplotlib

This command will start downloading and installing packages related to the matplotlib library. Once done, the message of successful installation will be displayed.

PIP users can open up the command prompt and run the below command to install Python Seaborn Package on Windows:

pip install Seaborn

The following message will be shown once the installation is completed:



<https://media.geeksforgeeks.org/wp-content/uploads/20210907232107/fgjghkyh.PNG>

PIP users can open up the command prompt and run the below command to install Python sklearn Package on Windows:

pip install --pre -U scikit-learn

**References:**

# https://www.pythoncentral.io/how-to-install-pandas-in-python/

<https://www.geeksforgeeks.org/how-to-install-seaborn-on-windows/>

<https://www.tutorialspoint.com/how-to-install-matplotlib-in-python>

# Activity 2

**Aim:** Creating arrays in NumPy

**Learning outcome:** Able to install and different operation in python

**Duration:** 3.5 hour

**List of Hardware/Software requirements:**

1. Laptop/Computer with Windows 10/11
2. Internet connection
3. Python

**Program / Procedure :**

**Create a NumPy ndarray Object**

NumPy is used to work with arrays. The array object in NumPy is called ndarray.

We can create a NumPy ndarray object by using the array() function.

import numpy as np  
  
arr = np.array([1, 2, 3, 4, 5])  
  
print(arr)  
  
print(type(arr))

**References:**

# <https://www.w3schools.com/python/numpy/numpy_creating_arrays.asp>

# Activity 3

**Aim:** Creating multidimensional array in NumPy

**Learning outcome:** Able to install and different operation in python

**Duration:** 3.5 hour

**List of Hardware/Software requirements:**

1. Laptop/Computer with Windows 10/11
2. Internet connection
3. Python

# Program / Procedure :

## Multidimension Arrays

A dimension in arrays is one level of array depth (nested arrays).

## 0-D Arrays

0-D arrays, or Scalars, are the elements in an array. Each value in an array is a 0-D array.

import numpy as np  
  
arr = np.array(42)  
  
print(arr)

## 1-D Arrays

An array that has 0-D arrays as its elements is called uni-dimensional or 1-D array.

These are the most common and basic arrays.

import numpy as np  
  
arr = np.array([1, 2, 3, 4, 5])  
  
print(arr)

## 2-D Arrays

An array that has 1-D arrays as its elements is called a 2-D array.

These are often used to represent matrix or 2nd order tensors.

import numpy as np  
  
arr = np.array([[1, 2, 3], [4, 5, 6]])  
  
print(arr)

## 3-D arrays

An array that has 2-D arrays (matrices) as its elements is called 3-D array.

These are often used to represent a 3rd order tensor

import numpy as np  
  
arr = np.array([[[1, 2, 3], [4, 5, 6]], [[1, 2, 3], [4, 5, 6]]])  
  
print(arr)

**Reference:**

# <https://www.w3schools.com/python/numpy/numpy_creating_arrays.asp>

# Activity 4

**Aim:** Numpy Operations, methods and attributes

**Learning outcome:** Able to install and different operation in python

**Duration:** 3.5 hour

**List of Hardware/Software requirements:**

1. Laptop/Computer with Windows 10/11
2. Internet connection
3. Python

# Program / Procedure :

**Basic Array Attributes**

Armed with our understanding of multidimensional NumPy arrays, we now look at methods for programmatically inspecting an array’s attributes (e.g. its dimensionality). It is especially important to understand what an array’s “shape” is.

We will use the following array to provide context for our discussion:

>>> import numpy as np

>>> example\_array = np.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]]])

According to the preceding discussion, it is a 3-dimensional array structured such that:

* axis-0 discerns which of the 3 sheets to select from.
* axis-1 discerns which of the 2 rows, in any sheet, to select from.
* axis-2 discerns which of the 4 columns, in any sheet and row, to select from.

**ndarray.ndim:**

The number of axes (dimensions) of the array.

*# dimensionality of the array*

>>> example\_array.ndim

3

**ndarray.shape:**

A tuple of integers indicating the number of elements that are stored along each dimension of the array. For a 2D-array with N rows and M columns, shape will be (N,M). The length of this shape-tuple is therefore equal to the number of dimensions of the array.

*# shape of the array*

>>> example\_array.shape

(3, 2, 4)

**ndarray.size:**

The total number of elements of the array. This is equal to the product of the elements of the array’s shape.

*# size of the array: the number of elements it stores*

>>> example\_array.size

24

**ndarray.dtype:**

An object describing the data type of the elements in the array. Recall that NumPy’s ND-arrays are *homogeneous*: they can only posses numbers of a uniform data type.

*# `example\_array` contains integers, each of which are stored using 32 bits of memory*

>>> example\_array.dtype

dtype('int32')

**ndarray.itemsize:**

The size, in bytes (8 bits is 1 byte), of each element of the array. For example, an array of elements of type float64 has itemsize 8 (=64/8), while an array of type complex32 has itemsize 4 (=32/8).

*# each integer in `example\_array` is represented using 4 bytes (32 bits) of memory*

>>> example\_array.itemsize

4

**Reference:**

https://www.geeksforgeeks.org/load-csv-data-into-mysql-server-using-php/

# Activity 5

**Aim:** Numpy case studies

**Learning outcome:** Able to install and different operation in python

**Duration:** 3.5 hour

**List of Hardware/Software requirements:**

1. Laptop/Computer with Windows 10/11
2. Internet connection
3. Python

# Program / Procedure :

# **Outline of this article:**

The following are the brief contents of what we will be covering in this article:

1- Installing Pandas to your computer

2- Reading a CSV file in Pandas and checking the read file

3- Getting some basic information about the data read in Pandas

As I am planning to continue Python Pandas as a series of articles, it is a good idea to mention the topics we will cover in the upcoming articles:

1- Filtering in Pandas

2-Adding/removing columns/rows and updating them

3- Sorting data, grouping and aggregating in Pandas

4-Cleaning issues in Pandas and examples

We are going to answer the following questions in this article:

1- How can I install Pandas to my computer?

2- How can I load a CSV file as a Pandas DataFrame?

3- How can I explore the basic information about a loaded CSV file(Pandas table)?

So let’s get to work and start exploring!!

We are going to use a CSV file downloaded from Kaggle named as “Are your employees burning out?”. It was already in my local drive. This dataset is also available for public use in Kaggle.com. Just go ahead and download it if you would like to do the same exercises with me in this article.

**How to install Pandas to your computer?**

As main aim of this article is explaining basics of Pandas, I will mention the very basic step of installing Pandas to your computer. Just execute the below command in your terminal within your **virtual environment**. For more detailed instructions on installing Pandas, a Google search may be helpful.

pip install pandas

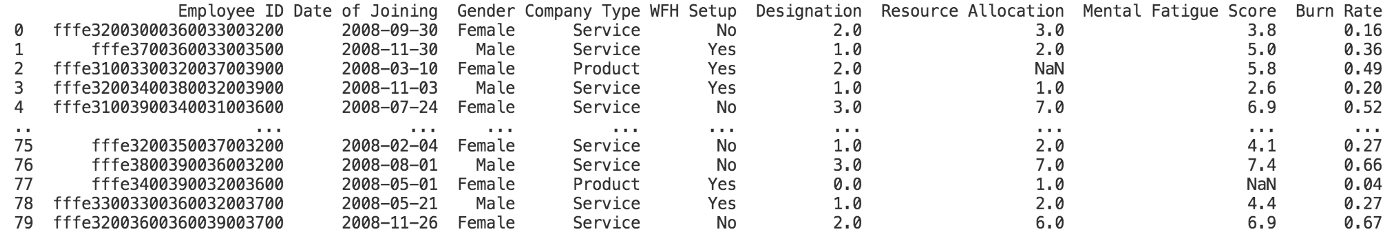
So let us start coding now, here we go with importing the Pandas library.

#Importing Pandas libraryimport pandas

Now let us read our .csv file from our local drive and and check whether it is loaded. To check the data read from the local drive, I mostly print the data with a head() function to see whether there is a problem in reading. Head() function shows the first 5 rows of the data unless a numerical value is given to the function.

data = pandas.read\_csv("/YOUR\_LOCAL\_PATH\_TO\_THIS\_FILE\_ON\_YOUR\_COMPUTER/train.csv", sep=",")

If a numerical value n is passed to the head() function, first n rows will be displayed. Maximum number of rows without any interruptions in displaying is 60. When 60 is exceeded, Pandas shows the first and last 5 rows within n range.



The displayed rows with data.head(80).

Table

Description automatically generated

The displayed rows with data.head(10).

Tail function can be used similarly to view the values at the bottom of the data table — so called Pandas DataFrame.

print(data.tail(10))

Table

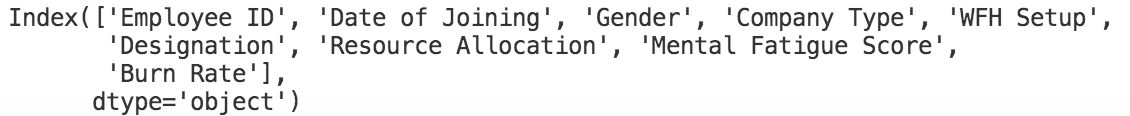
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The displayed rows with data.tail(10).

From now on, we are going to use DataFrame term instead of Pandas table below. You can think of a DataFrame as a large MS Excel spreadsheet.

For checking the column names of a DataFrame, .columns function is very useful. This is especially useful for DataFrames with too many column names.

print(data.columns)



The names of columns displayed after data.columns. This function is useful especially with DataFrames with too many columns.

Below are some basic functions to check the preliminary information about your DataFrame:

.shape function shows the total number of rows and columns of a DataFrame. Our DataFrame has 22750 rows and 9 columns according to this.

print(data.shape)



Number of rows and columns displayed after data.shape.

.info() function shows the main variable types under the relevant columns within the DataFrame.

print(data.info())

A screenshot of a computer

Description automatically generated with low confidence

Information displayed about the DataFrame after data.info() function. By default, this function shows the number of non-null entries in each column.

Above, we see that first five columns are probably filled with variables with a string type (or maybe with a Date type); and the remaining four columns have a float variable type. Please note that some other information is also included just above the variables/columns table.

The number of non-null values in each column are also shown.

As a final tool in this article, we can use the describe() function to see the basic statistical information about our columns with numerical values, which are Designation, Resource Allocation, Mental Fatigue Score and Burn Rate in this example.

print(data.describe())

Text

Description automatically generated with medium confidence

The basic statistics shown after data.describe() function

Total number of counts in each column (variable), averages, standard deviations, minimum values, maximum values and 25%, 50%(median) and 75% percentiles are shown after the describe function. With additional parameters passed to describe function, additional information may also be displayed.

**Reference:**

https://medium.com/@tansu\_61955/python-pandas-fast-forward-with-a-case-study-e44565a9da4b

# Activity 6

**Aim:** Understanding Pandas series and dataframe

**Learning outcome:** Able to install and different operation in python

**Duration:** 3.5 hour

**List of Hardware/Software requirements:**

1. Laptop/Computer with Windows 10/11
2. Internet connection
3. Python

# Program / Procedure :

**Creating a dataframe from Pandas series**

[Series](https://www.geeksforgeeks.org/python-pandas-series/) is a type of list in pandas which can take integer values, string values, double values and more. But in [Pandas Series](https://www.geeksforgeeks.org/python-pandas-series/) we return an object in the form of list, having index starting from *0* to *n*, Where *n* is the length of values in series.

Series can only contain single list with index, whereas dataframe can be made of more than one series or we can say that a dataframe is a collection of series that can be used to analyse the data.

**Code #1:** **Creating a simple Series**

|  |
| --- |
| import pandas as pd  import matplotlib.pyplot as pl  author = ['Jitender', 'Purnima', 'Arpit', 'Jyoti']  auth\_series = pd.Series(author)  print(auth\_series) |

**Output:**

0 Jitender

1 Purnima

2 Arpit

3 Jyoti

dtype: object

**Let’s check type of Series:**

|  |
| --- |
| import pandas as pd  import matplotlib.pyplot as plt  author = ['Jitender', 'Purnima', 'Arpit', 'Jyoti']  auth\_series = pd.Series(author)  print(type(auth\_series)) |

**Output:**

<class 'pandas.core.series.Series'>

**Code #2:** **Creating Dataframe from Series**

|  |
| --- |
| import pandas as pd  import matplotlib.pyplot as plt  author = ['Jitender', 'Purnima', 'Arpit', 'Jyoti']  article = [210, 211, 114, 178]  auth\_series = pd.Series(author)  article\_series = pd.Series(article)  frame = { 'Author': auth\_series, 'Article': article\_series }  result = pd.DataFrame(frame)  print(result) |

**Output:**

Author Article

0 Jitender 210

1 Purnima 211

2 Arpit 114

3 Jyoti 178

**Explanation:**

We are combining two series *Author*and *Article published*. Create a dictionary so that we can combine the metadata for series. Metadata is the data of data that can define the series of values. Pass this dictionary to pandas DataFrame and finally you can see the result as combination of two series i.e for author and number of articles.  
   
**Code #3: How to add series externally in dataframe**

|  |
| --- |
| import pandas as pd  import matplotlib.pyplot as plt  author = ['Jitender', 'Purnima', 'Arpit', 'Jyoti']  article = [210, 211, 114, 178]  auth\_series = pd.Series(author)  article\_series = pd.Series(article)  frame = { 'Author': auth\_series, 'Article': article\_series }  result = pd.DataFrame(frame)  age = [21, 21, 24, 23]  result['Age'] = pd.Series(age)  print(result) |

**Output:**

Author Article Age

0 Jitender 210 21

1 Purnima 211 21

2 Arpit 114 24

3 Jyoti 178 23

**Explanation:**

We have added one more series externally named as *age*of the authors, then directly added this series in the pandas dataframe. Remember one thing if any value is missing then by default it will be converted into NaN value i.e *null*by default.  
   
**Code #4:** **Missing value in dataframe**

|  |
| --- |
| import pandas as pd  import matplotlib.pyplot as plt  author = ['Jitender', 'Purnima', 'Arpit', 'Jyoti']  article = [210, 211, 114, 178]  auth\_series = pd.Series(author)  article\_series = pd.Series(article)  frame = { 'Author': auth\_series, 'Article': article\_series }  result = pd.DataFrame(frame)  age = [21, 21, 23]  result['Age'] = pd.Series(age)  print(result) |

**Output:**

Author Article Age

0 Jitender 210 21.0

1 Purnima 211 21.0

2 Arpit 114 23.0

3 Jyoti 178 NaN

**Code #5:** **Data Plot on graph**

Using plot.bar() we have created a bar graph.

|  |
| --- |
| import pandas as pd  import matplotlib.pyplot as plt  author = ['Jitender', 'Purnima', 'Arpit', 'Jyoti']  article = [210, 211, 114, 178]  auth\_series = pd.Series(author)  article\_series = pd.Series(article)  frame = { 'Author': auth\_series, 'Article': article\_series }  result = pd.DataFrame(frame)  age = [21, 21, 24, 23]  result['Age'] = pd.Series(age)  result.plot.bar()  plt.show() |

**Output:**

Chart, bar chart

Description automatically generated

https://media.geeksforgeeks.org/wp-content/uploads/Screenshot-2019-02-02-13.17.36.png

**Reference:**

https://www.geeksforgeeks.org/creating-a-dataframe-from-pandas-series/

# Activity 7

**Aim:** Pandas ingestion of data from csv, json, html, excel, text files

**Learning outcome:** Able to install and different operation in python

**Duration:** 3.5 hour

**List of Hardware/Software requirements:**

1. Laptop/Computer with Windows 10/11
2. Internet connection
3. Python

# Program / Procedure :

**Streamlined Data Ingestion with Pandas**

Data Ingestion is the process of, transferring data, from varied sources to an approach, where it can be analyzed, archived, or utilized by an establishment. The usual steps, involved in this process, are drawing out data, from its current place, converting the data, and, finally loading it, in a location, for efficient research. Python provides many such tools, and, frameworks for data ingestion. These include Bonobo, Beautiful Soup4, Airflow, Pandas, etc. In this article, we will learn about Data Ingestion with Pandas library.

**Data Ingestion with Pandas:**

Data Ingestion with Pandas, is the process, of shifting data, from a variety of sources, into the Pandas DataFrame structure. The source of data can be varying file formats such as Comma Separated Data, JSON, HTML webpage table, Excel. In this article, we will learn about, transferring data, from such formats, into the destination, which is a Pandas dataframe object.

**Approach:**

The basic approach, for transferring any such data, into a dataframe object, is as follows –

* Prepare your source data.
  + Data can be present, on any remote server, or, on a local machine. We need to know, the URL of the file if it’s on a remote server. The path of the file, on local machine, is required, if data is present locally.
* Use Pandas ‘read\_x’ method
  + Pandas provide ‘read\_x’ methods, for loading and converting the data, into a Dataframe object.
  + Depending on the data format, use the ‘read’ method.
* Print data from DataFrame object.
  + Print the dataframe object, to verify, that the conversion was smooth.

**File Formats for Ingestion:**

In this article, we will be converting, data present in the following files, to dataframe structures –

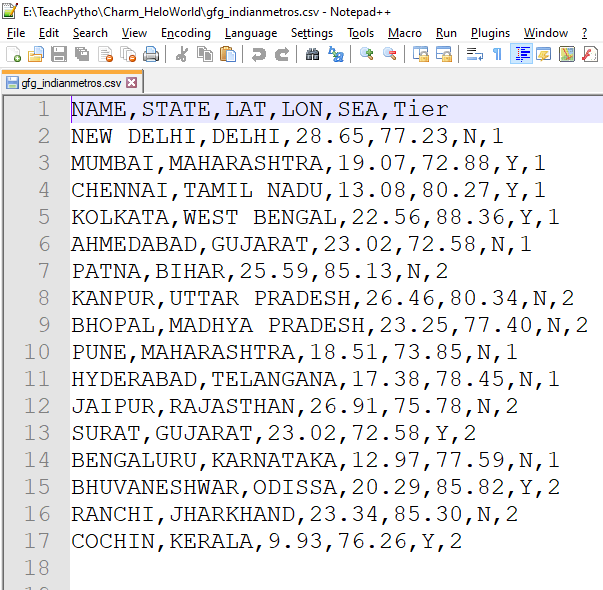
1. Read data from CSV file
2. Read data from Excel file
3. Read data from JSON file
4. Read data from Clipboard
5. Read data from HTML table from web page
6. Read data from SQLite table

**Read data from CSV file**

To load, data present in Comma-separated file(CSV), we will follow steps as below:

* Prepare your sample dataset. Here, we have a CSV file, containing information, about Indian Metro cities. It describes if the city is a Tier1 or Tier2 city, their geographical location, state they belong to, and if it is a coastal city.
* Use Pandas method ‘read\_csv’
  + Method used – *read\_csv(file\_path)*
  + Parameter – String format, containing the path of the file and its name, or, URL when present on the remote server. It reads, the file data, and, converts it, into a valid two-dimensional dataframe object. This method can be used to read data, present in “.csv” as well as “.txt” file formats.

The file contents are as follows:



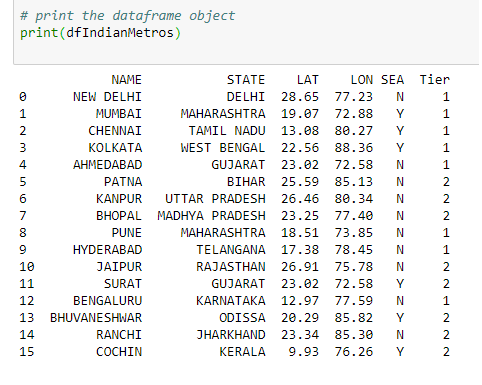
*The contents of “gfg\_indianmetros.csv” file*

*https://media.geeksforgeeks.org/wp-content/uploads/20210617085639/gfgindianmetros.png*

The code to get the data in a Pandas Data Frame is:

|  |
| --- |
| # Import the Pandas library  import pandas  # Load data from Comma separated file  # Use method - read\_csv(filepath)  # Parameter - the path/URL of the CSV/TXT file  dfIndianMetros = pandas.read\_csv("gfg\_indianmetros.csv")  # print the dataframe object  print(dfIndianMetros) |

**Output:**



*The CSV data, in  dataframe object*

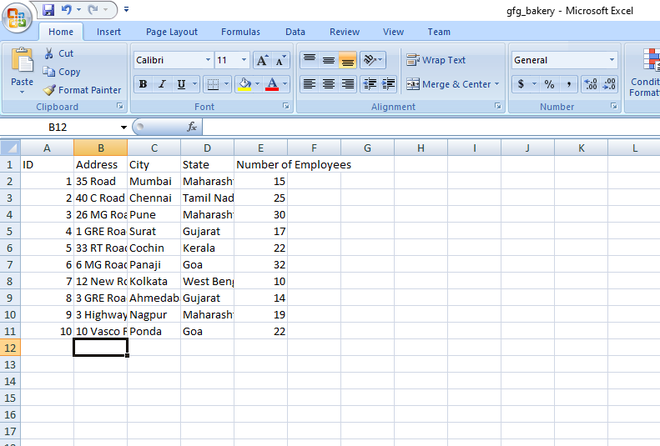
*https://media.geeksforgeeks.org/wp-content/uploads/20210617091539/dfcsv.png*

**Read data from an Excel file**

To load data present in an Excel file(.xlsx, .xls) we will follow steps as below-

* Prepare your sample dataset. Here, we have an Excel file, containing information about Bakery and its branches. It describes the number of employees, address of branches of the bakery.
* Use Pandas method  ‘read\_excel’ .
  + Method used – *read\_excel(file\_path)*
  + Parameter – The method accepts, the path of the file and its name, in string format as a parameter. The file can be on a remote server, or, on a machine locally. It reads the file data, and, converts it, into a valid two-dimensional data frame object. This method, can be used, to read data present in “.xlsx” as well as “.xls” file formats.

The file contents are as follows:



*The contents of  “gfg\_bakery.xlsx” file*

*https://media.geeksforgeeks.org/wp-content/uploads/20210615103200/gfgbakery.png*

The code to get the data in a Pandas DataFrame is:

|  |
| --- |
| # Import the Pandas library  import pandas  # Load data from an Excel file  # Use method - read\_excel(filepath)  # Method parameter - The file location(URL/path) and name  dfBakery = pandas.read\_excel("gfg\_bakery.xlsx")  # print the dataframe object  print(dfBakery) |

**Output:**

Table

Description automatically generated

*The Excel data, in  dataframe object*

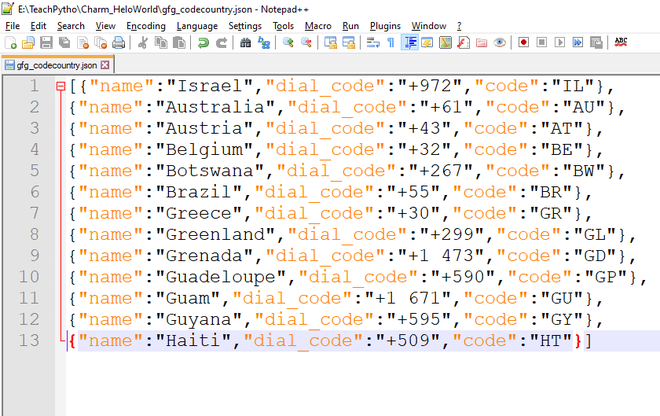
*https://media.geeksforgeeks.org/wp-content/uploads/20210616081849/dfxlsx.png*

**Read data from a JSON file**

To load data present in a JavaScript Object Notation file(.json) we will follow steps as below:

* Prepare your sample dataset. Here, we have a JSON file, containing information about Countries and their dial code.
* Use Pandas method  ‘read\_json’ .
  + Method used – *read\_json(file\_path)*
  + Parameter – This method, accepts the path of the file and its name, in string format, as a parameter. It reads the file data, and, converts it, into a valid two-dimensional data frame object.

The file contents are as follows:



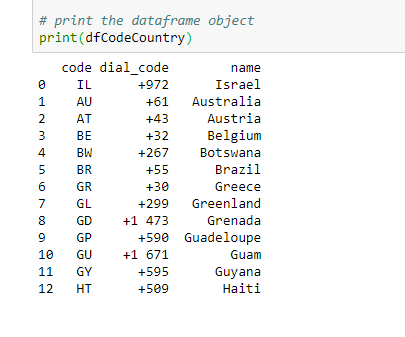
*The contents of  “gfg\_codecountry.json” file*

*https://media.geeksforgeeks.org/wp-content/uploads/20210616090239/gfgcodecountry.png*

The code to get the data in a Pandas DataFrame is:

|  |
| --- |
| # Import the Pandas library  import pandas  # Load data from a JSON file  # Use method - read\_json(filepath)  # Method parameter - The file location(URL/path) and name  dfCodeCountry = pandas.read\_json("gfg\_codecountry.json")  # print the dataframe object  print(dfCodeCountry) |

**Output:**



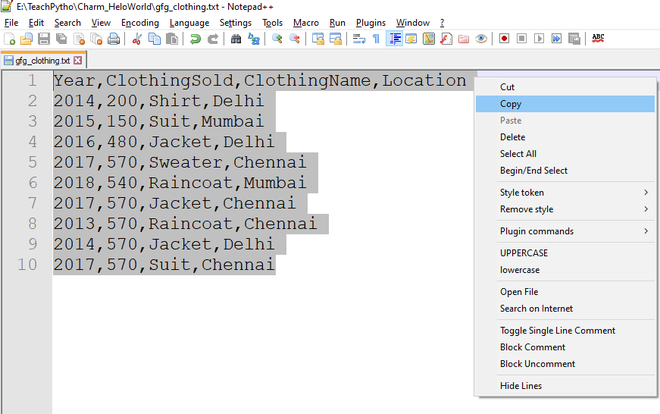
*The JSON data, in  dataframe objects*

**Read data from Clipboard**

We can also transfer data present in Clipboard to a dataframe object. A clipboard is a part of Random Access Memory(RAM), where copied data is present. Whenever we copy any file, text, image, or any type of data, using the ‘Copy’ command, it gets stored in the Clipboard. To convert, data present here, follow the steps as mentioned below –

* Select all the contents of the file. The file should be a CSV file. It can be a ‘.txt’ file as well, containing comma-separated values, as shown in the example. Please note, if the file contents are not in a favorable format, then, one can get a Parser Error at runtime.
* Right, Click and say Copy. Now, this data is transferred, to the computer Clipboard.
* Use Pandas method  ‘read\_clipboard’ .
  + Method used – read\_clipboard
  + Parameter – The method, does not accept any parameter. It reads the latest copied data as present in the clipboard, and, converts it, into a valid two-dimensional dataframe object.

The file contents selected are as follows:



*The contents of  “gfg\_clothing.txt” file*

*https://media.geeksforgeeks.org/wp-content/uploads/20210616092113/gfgclothing.png*

The code to get the data in a Pandas DataFrame is

|  |
| --- |
| # Import the required library  import pandas  # Copy file contents which are in proper format  # Whatever data you have copied will  # get transferred to dataframe object  # Method does not accept any parameter  pdCopiedData = pd.read\_clipboard()  # Print the data frame object  print(pdCopiedData) |

**Output:**

Text, letter

Description automatically generated

*The clipboard data, in  dataframe object*

**Read data from HTML file**

A webpage is usually made of HTML elements. There are different HTML tags such as <head>, <title> , <table>, <div> based on the purpose of data display, on browser. We can transfer, the content between <table> element, present in an HTML webpage, to a Pandas data frame object. Follow the steps as mentioned below –

* Select all the elements present in the <table>, between start and end tags. Assign it, to a Python variable.
* Use Pandas method  ‘read\_html’ .
  + Method used – read\_html(string within <table> tag)
  + Parameter – The method, accepts string variable, containing the elements present between <table> tag. It reads the elements, traversing through the table, <tr> and <td> tags, and, converts it, into a list object. The first element of the list object is the desired dataframe object.

The HTML webpage used is as follows:

|  |
| --- |
| <!DOCTYPE html>  <html>  <head>  <title>Data Ingestion with Pandas Example</title>  </head>  <body>  <h2>Welcome To GFG</h2>  <table>    <thead>      <tr>        <th>Date</th>        <th>Empname</th>        <th>Year</th>        <th>Rating</th>        <th>Region</th>      </tr>    </thead>    <tbody>      <tr>        <td>2020-01-01</td>        <td>Savio</td>        <td>2004</td>        <td>0.5</td>        <td>South</td>      </tr>      <tr>        <td>2020-01-02</td>        <td>Rahul</td>        <td>1998</td>        <td>1.34</td>        <td>East</td>      </tr>      <tr>        <td>2020-01-03</td>        <td>Tina</td>        <td>1988</td>        <td>1.00023</td>        <td>West</td>      </tr>       <tr>        <td>2021-01-03</td>        <td>Sonia</td>        <td>2001</td>        <td>2.23</td>        <td>North</td>      </tr>    </tbody>  </table>  </body>  </html> |

Write the following code to convert the HTML table content in the Pandas Dataframe object:

|  |
| --- |
| # Import the Pandas library  import pandas  # Variable containing the elements  # between <table> tag from webpage  html\_string = """  <table>    <thead>      <tr>        <th>Date</th>        <th>Empname</th>        <th>Year</th>        <th>Rating</th>        <th>Region</th>      </tr>    </thead>    <tbody>      <tr>        <td>2020-01-01</td>        <td>Savio</td>        <td>2004</td>        <td>0.5</td>        <td>South</td>      </tr>      <tr>        <td>2020-01-02</td>        <td>Rahul</td>        <td>1998</td>        <td>1.34</td>        <td>East</td>      </tr>      <tr>        <td>2020-01-03</td>        <td>Tina</td>        <td>1988</td>        <td>1.00023</td>        <td>West</td>      </tr>       <tr>        <td>2021-01-03</td>        <td>Sonia</td>        <td>2001</td>        <td>2.23</td>        <td>North</td>      </tr>      <tr>        <td>2008-01-03</td>        <td>Milo</td>        <td>2008</td>        <td>3.23</td>        <td>East</td>      </tr>      <tr>        <td>2006-01-03</td>        <td>Edward</td>        <td>2005</td>        <td>0.43</td>        <td>West</td>      </tr>    </tbody>  </table>"""    # Pass the string containing html table element  df = pandas.read\_html(html\_string)  # Since read\_html, returns a list object,  # extract first element of the list  dfHtml = df[0]  # Print the data frame object  print(dfHtml) |

**Output:**

Table

Description automatically generated

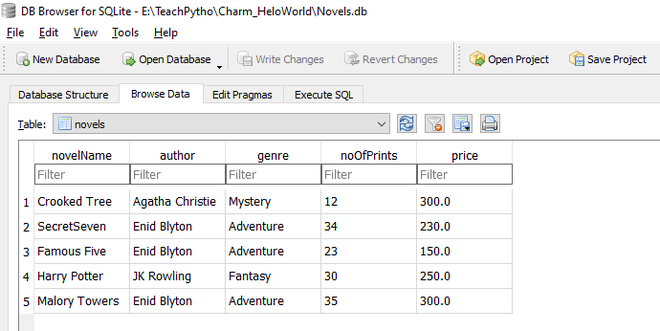
*The HTML <table> data, in  dataframe object,*

**Read data from SQL table**

We can convert, data present in database tables, to valid dataframe objects as well. Python allows easy interface, with a variety of databases, such as SQLite, MySQL, MongoDB, etc. SQLite is a lightweight database, which can be embedded in any program. The SQLite database holds all the related SQL tables. We can load, SQLite table data, to a Pandas dataframe object. Follow the steps, as mentioned below –

* Prepare a sample SQLite table using ‘DB Browser for SQLite tool’ or any such tool. These tools allow the effortless creation, edition of database files compatible with SQLite. The database file, has a ‘.db’ file extension. In this example, we have*‘Novels.db’* file, containing a table called “novels”. This table has information about Novels, such as Novel Name, Price, Genre, etc.
* Here, to connect to the database, we will import the ‘sqlite3’ module, in our code. The sqlite3 module, is an interface, to connect to the SQLite databases. The sqlite3 library is included in  Python, since Python version 2.5. Hence, no separate installation is required. To connect to the database, we will use the SQLite method ‘connect’, which returns a connection object. The connect method accepts the following parameters:
  + *database\_name*– The name of the database in which the table is present. This is a .db extension file. If the file is present, an open connection object is returned. If the file is not present, it is created first and then a connection object is returned.
* Use Pandas method  ‘read\_sql\_query’.
  + Method used – *read\_sql\_query*
  + Parameter – This method  accepts the following parameters
    - SQL query – Select query, to fetch the required rows from the table.
    - Connection object – The connection object returned by the ‘connect’ method. The *read\_sql\_query*method, converts, the resultant rows of the query, to a dataframe object.
* Print the dataframe object using the print method.

The ***Novels.db*** database file looks as follows –



*The novels table, as seen, using DB Browser for SQLite tool*

Write the following code to convert the Novels table, in Pandas Data frame object:

|  |
| --- |
| # Import the required libraries  import sqlite3  import pandas  # Prepare a connection object  # Pass the Database name as a parameter  conn = sqlite3.connect("Novels.db")  # Use read\_sql\_query method  # Pass SELECT query and connection object as parameter  pdSql = pd.read\_sql\_query("SELECT \* FROM novels", conn)  # Print the dataframe object  print(pdSql)  # Close the connection object  conn.close() |

**Output:**

Table

Description automatically generated

*The Novels table data in  dataframe object*

**Reference:**

https://www.geeksforgeeks.org/streamlined-data-ingestion-with-pandas/

# Activity 8

**Aim:** Pandas functionalities for Series & Data Frames

**Learning outcome:** Able to install and different operation in python

**Duration:** 3.5 hour

**List of Hardware/Software requirements:**

1. Laptop/Computer with Windows 10/11
2. Internet connection
3. Python

# Program / Procedure :

**Python | Pandas Series**

Pandas Series is a one-dimensional labeled array capable of holding data of any type (integer, string, float, python objects, etc.). The axis labels are collectively called *index*. Pandas Series is nothing but a column in an excel sheet.

Labels need not be unique but must be a hashable type. The object supports both integer and label-based indexing and provides a host of methods for performing operations involving the index.  
Table

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In this article, we are using [nba.csv](https://media.geeksforgeeks.org/wp-content/uploads/nba.csv) file.

We will get a brief insight on all these basic operations which can be performed on Pandas Series :

* [Creating a Series](https://www.geeksforgeeks.org/python-pandas-series/#Basics)
* [Accessing element of Series](https://www.geeksforgeeks.org/python-pandas-series/#Basics1)
* [Indexing and Selecting Data in Series](https://www.geeksforgeeks.org/python-pandas-series/#Basics2)
* [Binary operation on Series](https://www.geeksforgeeks.org/python-pandas-series/#Basics3)
* [Conversion Operation on Series](https://www.geeksforgeeks.org/python-pandas-series/#Basics4)

**Creating a Pandas Series**

In the real world, a Pandas Series will be created by loading the datasets from existing storage, storage can be SQL Database, CSV file, and Excel file. Pandas Series can be created from the lists, dictionary, and from a scalar value etc. Series can be created in different ways, here are some ways by which we create a series:

**Creating a series from array:** In order to create a series from array, we have to import a numpy module and have to use array() function.

|  |
| --- |
| # import pandas as pd  import pandas as pd    # import numpy as np  import numpy as np    # simple array  data = np.array(['g','e','e','k','s'])    ser = pd.Series(data)  print(ser) |

**Output :**

![Chart

Description automatically generated with low confidence](data:image/jpeg;base64,/9j/4AAQSkZJRgABAQEAYABgAAD/4RD6RXhpZgAATU0AKgAAAAgABAE7AAIAAAAQAAAISodpAAQAAAABAAAIWpydAAEAAAAgAAAQ0uocAAcAAAgMAAAAPgAAAAAc6gAAAAgAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAEFiaGlzaGVrIFRpd2FyaQAABZADAAIAAAAUAAAQqJAEAAIAAAAUAAAQvJKRAAIAAAADODYAAJKSAAIAAAADODYAAOocAAcAAAgMAAAInAAAAAAc6gAAAAgAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA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RolJicoKSo0NTY3ODk6Q0RFRkdISUpTVFVWV1hZWmNkZWZnaGlqc3R1dnd4eXqDhIWGh4iJipKTlJWWl5iZmqKjpKWmp6ipqrKztLW2t7i5usLDxMXGx8jJytLT1NXW19jZ2uHi4+Tl5ufo6erx8vP09fb3+Pn6/8QAHwEAAwEBAQEBAQEBAQAAAAAAAAECAwQFBgcICQoL/8QAtREAAgECBAQDBAcFBAQAAQJ3AAECAxEEBSExBhJBUQdhcRMiMoEIFEKRobHBCSMzUvAVYnLRChYkNOEl8RcYGRomJygpKjU2Nzg5OkNERUZHSElKU1RVVldYWVpjZGVmZ2hpanN0dXZ3eHl6goOEhYaHiImKkpOUlZaXmJmaoqOkpaanqKmqsrO0tba3uLm6wsPExcbHyMnK0tPU1dbX2Nna4uPk5ebn6Onq8vP09fb3+Pn6/9oADAMBAAIRAxEAPwD6RooooAKKwPHGqTaN4L1G+tpmt5I0VfPSMyNEGYKXCgHcVBJAwckVieDmv7Pxffae0WpQ6XLZR3FvDqt+11cI4dkZyWZyiuMYTecbCSEJIpJpy5f6/rQHor/12/U7qiiimAUUVznjfxG/hnR7a4juLOyNzeR2xvb8E29qGyS7gMpI4wPmHLDJAzSbsB0dFc34F1fVNc0GW+1eexuQ11KlrPYW7xRTQqxVZBudyQ2Mgg4weMjk9JTAKKKKACiiigAooooAKKKKACiiigAooooAhvLO21Cyms76CO4tp0McsMqhldSMEEHqDVHRfDemeH1l/s2KbfMFDzXN1Lcysq/dXzJWZtoycLnAycDk1fuvtH2WT7F5X2jbiMzZ2A+pxyR7cZ9R1rB8Eahf6ho942rXX2ue31O8thL5aplI5mVRhRjgADufUnrQnq0u39fmNrS/n/X5HR0UUUCCua8a6Dfa7aaf/ZvlO9nd+e0T3ktmZF8t0wtxEC8ZBcHKjkAqeCa6WsHxd4ptvCelw3Ny9oslzOtvAb27W2h3kFsvKQdihVY5wT0ABJFJjV+gnhDSNT0jTLiPV7kyNLcGSG3+2S3gtUwBsE8uJJMkFssBjdgDABO/WF4S8UW/ivSJLu3NqzQTtbymzuhcwlwAcxygDepDA5wD1BAIrdqnclWewUUUUhhRRRQAUUUUAFFFFABRRRQAUUUUARXUL3FpLDDcy2ryIVWeEKXjJ/iAYMuR7gj2rG8M+Fz4ZW6Rda1HUY7mZ7hkvVgwkjsXdh5cSHkseDkDsBWxdm5FnN9hERudh8oTEhN2ON2OcfSsPw3q2p3OratpOsS2d1NpzRf6XYwtDG3mKW2FGdyrrgE/Mch1OBmhbg3pY6KiiigArO1rRYdat4Ueee0ntpRNbXVsyiSCQAjcu4FT8rMCGBBBORWjWfrOsR6NaxyNbz3c08oht7W2CmSeQgnau4hRwrEliAACSaAJdNs57CyEF1qV1qUgJJuLpYlc+2I0ReP92rdZ+jaxFrVpJKkE9rNDK0Nxa3AUSQSDB2ttLKeCCCCQQQQa0KBIKKKKBhRRRQAUUUUAFFFFABRRRQAUUUUAVdTgu7nSrqDTLxbG7kiZIbpoRKIXI4fYSA2OuCaxvB3h7UvDWnGxv9Qsb2IfOHt7KSGWSQkl5JHeaTezE5J45/Ib9y062srWkccs4QmNJZCis2OAWAYgZ74P0NZOg6ze6hdX9lq1hBZ3liyCQWtybiFg67hhyiHdjqCoxkcnNC3B7I2qKKKACsDxf4UtvFum29vcC1aS1uBcQi8tVuYCwUriSIkb1IY8ZBBwQQRW/WPr+rT6VJpK26xsL3UI7WTzAThGViSMEc/KKTtpfy/Meyb9RfDOhL4e0cWSwaVCfMZ2Glaf9jhJPfy9784Ayc81r1R0nWbHXLV7nS5Wnt1kMYm8p1SQjujMAHX0dcqexq9VO/UVraBRRRSAKKKKACiiigAooooAKKKKACiiigCG888WU32SGGefYfLinkMaO2OAzBWIB9dp+hrnfCHhyfRLi8new03RoLhI0TStJkL20ZUsTLzHGN7bgDhBwi5J7dRWN4e8UWPiY3x01JvKtJhEJpFAScFQweMgnKEHgnGeo4wSJ2YPY2aKKKACub8beFF8Y6XZ6bO2LVbtZbkCV42aLaysFZecnd04BGc10lQXt9aaZZS3mpXUNpawjdJPPII0QepY8Ck0nv8A1Yav0KPh221Sx0pbLWXtpntj5UNxAcGeMDCs6bQEfHVVyvGRjOBq1W0/UrHV7GO90q8t760kzsntpVkjfBwcMpIOCCPwqzVO99SVZLQKKKKQwooooAKKKKACiiigAooooAKKKKAMvxJpl1rPh2706wvVsZrlPLM7xGQBSfmG0Mp5XIyGBGcg5rG8I6Jr+ka5rD6vcaa9nMYhbrZWLQA7YkUEAzPtUAbdpHUZBxxXW1QXWbZtavNMKyLLZ20VzI5A27JDIBjnOR5TZ49OtK1tR6tf1/XYv0VBZXkGo6fb3tnJ5lvcxLLE+0jcrDIODyOD3qeqaadmSmmroKwvF9m19oQjjs9Supknjli/syWFJ4nRtyyAzMqHBA4bIPTBrdoqRmP4WOsnQ1/4SLf9q8x9nnCMTeVu+TzfKJj8zHXZ8vpjpWxRRTAKKpz6nDb6vZ6c6yGa7SR42AG0BNuc85/iGKkv7v7BptzefZ57n7PE0vkWyb5JNoJ2ovdjjAHc0roaTbsWKKitLj7XZQXHlSw+dGr+VMu10yM7WHYjoRUtU9HYlO6ugoqvNf20F7bWksm2e63eSm0ndtGW56DAPerFIYUUUUAFFFFABRRRQBjeLkvJfCOoppqzNcGE4W3JEjLkbgpHO4rkDHOenNcf4e8NaHfax4ih0/wiljod5p9okcN1pItormRHnJbynUHIJX76g8A9CpPpNFK2jXcpSt/Xp/keaeHfDOlXPw5l0nSNBGi61Ba25nkk0p7TdeQ/NG5kKKJsSJncpYYPXDc1dTe21Xwa3iy/gu0TWtR09vKiSRpktUmQIgEWXOSZHwuSfMxXpOqaVbazYNZ33n+Q5BYQXMkJb2LRsCQe4zg96W40qyubOC0lt1+z28kckMaZRUaNgyYAxwCo46cVfM3Lmfdfnr+X3GbiuTlXZ/lY8zu9HuG8Lap/wjujvY6DPqkMi6fLpcmDbqiiVvsYaNyhcZMfylwGO1g2G2vDOmW1p4A1yK5hmvtNn85v7Ms9EuNN2xmIB4YbeVt43HcRggFnOMV3tFT0a7/8D/ItPVPsVNJWFNFsltbeW1gW3jEcEwIeJdowrAknIHB5PSuc8cWsNxdaQ+saZNqmhRSSG9tYrVroFymImeFQzSKDngK2CVbHy5HXUUS1dyYrlVjyb+yrKKPRW13QNQl0FZ79rewGnXF0IYWZDCkkCKxVcAsEcYX5RhSoA2l8JWE/wvaDxHo1rdPZwXb2UV9bJK1nEzO0SLkHaVTy146bQO1d/WVrXhvTvEKxpqoupIkBUwxXs0McqnGVkRHCyA4xhwRjI7molG8HFdf8rfeXF2kn/X/DHnWvaZdXek+FTfWUFzpUekIhS60GfVkjnKJyYInVlbaCA5VgPmGV3fNpXmlwRweG18WWl74j0S300xkPpU1xm5+TbJLbYeQNsDAFlJU7skFufR1VUQIihVUYAAwAKWtZO7v5t/ff/PQzhHlil2Vvy/y1PP8AxV4d8Ny6joGs33hSG+sIo2glC6KbiSOMx/ug0IjLhVIxjb8pPQc13doIRZQC1i8mARr5cflmPYuOBtIBXA7YGKloqe47BRRRQMKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigD//Z)  
   
[**Creating a series from Lists**](https://www.geeksforgeeks.org/creating-a-pandas-series-from-lists/)**:**  
In order to create a series from list, we have to first create a list after that we can create a series from list.

|  |
| --- |
| import pandas as pd    # a simple list  list = ['g', 'e', 'e', 'k', 's']    # create series form a list  ser = pd.Series(list)  print(ser) |

**Output :**

![Chart

Description automatically generated with low confidence](data:image/jpeg;base64,/9j/4AAQSkZJRgABAQEAYABgAAD/4RD6RXhpZgAATU0AKgAAAAgABAE7AAIAAAAQAAAISodpAAQAAAABAAAIWpydAAEAAAAgAAAQ0uocAAcAAAgMAAAAPgAAAAAc6gAAAAgAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAEFiaGlzaGVrIFRpd2FyaQAABZADAAIAAAAUAAAQqJAEAAIAAAAUAAAQvJKRAAIAAAADODYAAJKSAAIAAAADODYAAOocAAcAAAgMAAAInAAAAAAc6gAAAAgAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA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RolJicoKSo0NTY3ODk6Q0RFRkdISUpTVFVWV1hZWmNkZWZnaGlqc3R1dnd4eXqDhIWGh4iJipKTlJWWl5iZmqKjpKWmp6ipqrKztLW2t7i5usLDxMXGx8jJytLT1NXW19jZ2uHi4+Tl5ufo6erx8vP09fb3+Pn6/8QAHwEAAwEBAQEBAQEBAQAAAAAAAAECAwQFBgcICQoL/8QAtREAAgECBAQDBAcFBAQAAQJ3AAECAxEEBSExBhJBUQdhcRMiMoEIFEKRobHBCSMzUvAVYnLRChYkNOEl8RcYGRomJygpKjU2Nzg5OkNERUZHSElKU1RVVldYWVpjZGVmZ2hpanN0dXZ3eHl6goOEhYaHiImKkpOUlZaXmJmaoqOkpaanqKmqsrO0tba3uLm6wsPExcbHyMnK0tPU1dbX2Nna4uPk5ebn6Onq8vP09fb3+Pn6/9oADAMBAAIRAxEAPwD6RooooAKKwPHGqTaN4L1G+tpmt5I0VfPSMyNEGYKXCgHcVBJAwckVieDmv7Pxffae0WpQ6XLZR3FvDqt+11cI4dkZyWZyiuMYTecbCSEJIpJpy5f6/rQHor/12/U7qiiimAUUVznjfxG/hnR7a4juLOyNzeR2xvb8E29qGyS7gMpI4wPmHLDJAzSbsB0dFc34F1fVNc0GW+1eexuQ11KlrPYW7xRTQqxVZBudyQ2Mgg4weMjk9JTAKKKKACiiigAooooAKKKKACiiigAooooAhvLO21Cyms76CO4tp0McsMqhldSMEEHqDVHRfDemeH1l/s2KbfMFDzXN1Lcysq/dXzJWZtoycLnAycDk1fuvtH2WT7F5X2jbiMzZ2A+pxyR7cZ9R1rB8Eahf6ho942rXX2ue31O8thL5aplI5mVRhRjgADufUnrQnq0u39fmNrS/n/X5HR0UUUCCua8a6Dfa7aaf/ZvlO9nd+e0T3ktmZF8t0wtxEC8ZBcHKjkAqeCa6WsHxd4ptvCelw3Ny9oslzOtvAb27W2h3kFsvKQdihVY5wT0ABJFJjV+gnhDSNT0jTLiPV7kyNLcGSG3+2S3gtUwBsE8uJJMkFssBjdgDABO/WF4S8UW/ivSJLu3NqzQTtbymzuhcwlwAcxygDepDA5wD1BAIrdqnclWewUUUUhhRRRQAUUUUAFFFFABRRRQAUUUUARXUL3FpLDDcy2ryIVWeEKXjJ/iAYMuR7gj2rG8M+Fz4ZW6Rda1HUY7mZ7hkvVgwkjsXdh5cSHkseDkDsBWxdm5FnN9hERudh8oTEhN2ON2OcfSsPw3q2p3OratpOsS2d1NpzRf6XYwtDG3mKW2FGdyrrgE/Mch1OBmhbg3pY6KiiigArO1rRYdat4Ueee0ntpRNbXVsyiSCQAjcu4FT8rMCGBBBORWjWfrOsR6NaxyNbz3c08oht7W2CmSeQgnau4hRwrEliAACSaAJdNs57CyEF1qV1qUgJJuLpYlc+2I0ReP92rdZ+jaxFrVpJKkE9rNDK0Nxa3AUSQSDB2ttLKeCCCCQQQQa0KBIKKKKBhRRRQAUUUUAFFFFABRRRQAUUUUAVdTgu7nSrqDTLxbG7kiZIbpoRKIXI4fYSA2OuCaxvB3h7UvDWnGxv9Qsb2IfOHt7KSGWSQkl5JHeaTezE5J45/Ib9y062srWkccs4QmNJZCis2OAWAYgZ74P0NZOg6ze6hdX9lq1hBZ3liyCQWtybiFg67hhyiHdjqCoxkcnNC3B7I2qKKKACsDxf4UtvFum29vcC1aS1uBcQi8tVuYCwUriSIkb1IY8ZBBwQQRW/WPr+rT6VJpK26xsL3UI7WTzAThGViSMEc/KKTtpfy/Meyb9RfDOhL4e0cWSwaVCfMZ2Glaf9jhJPfy9784Ayc81r1R0nWbHXLV7nS5Wnt1kMYm8p1SQjujMAHX0dcqexq9VO/UVraBRRRSAKKKKACiiigAooooAKKKKACiiigCG888WU32SGGefYfLinkMaO2OAzBWIB9dp+hrnfCHhyfRLi8new03RoLhI0TStJkL20ZUsTLzHGN7bgDhBwi5J7dRWN4e8UWPiY3x01JvKtJhEJpFAScFQweMgnKEHgnGeo4wSJ2YPY2aKKKACub8beFF8Y6XZ6bO2LVbtZbkCV42aLaysFZecnd04BGc10lQXt9aaZZS3mpXUNpawjdJPPII0QepY8Ck0nv8A1Yav0KPh221Sx0pbLWXtpntj5UNxAcGeMDCs6bQEfHVVyvGRjOBq1W0/UrHV7GO90q8t760kzsntpVkjfBwcMpIOCCPwqzVO99SVZLQKKKKQwooooAKKKKACiiigAooooAKKKKAMvxJpl1rPh2706wvVsZrlPLM7xGQBSfmG0Mp5XIyGBGcg5rG8I6Jr+ka5rD6vcaa9nMYhbrZWLQA7YkUEAzPtUAbdpHUZBxxXW1QXWbZtavNMKyLLZ20VzI5A27JDIBjnOR5TZ49OtK1tR6tf1/XYv0VBZXkGo6fb3tnJ5lvcxLLE+0jcrDIODyOD3qeqaadmSmmroKwvF9m19oQjjs9Supknjli/syWFJ4nRtyyAzMqHBA4bIPTBrdoqRmP4WOsnQ1/4SLf9q8x9nnCMTeVu+TzfKJj8zHXZ8vpjpWxRRTAKKpz6nDb6vZ6c6yGa7SR42AG0BNuc85/iGKkv7v7BptzefZ57n7PE0vkWyb5JNoJ2ovdjjAHc0roaTbsWKKitLj7XZQXHlSw+dGr+VMu10yM7WHYjoRUtU9HYlO6ugoqvNf20F7bWksm2e63eSm0ndtGW56DAPerFIYUUUUAFFFFABRRRQBjeLkvJfCOoppqzNcGE4W3JEjLkbgpHO4rkDHOenNcf4e8NaHfax4ih0/wiljod5p9okcN1pItormRHnJbynUHIJX76g8A9CpPpNFK2jXcpSt/Xp/keaeHfDOlXPw5l0nSNBGi61Ba25nkk0p7TdeQ/NG5kKKJsSJncpYYPXDc1dTe21Xwa3iy/gu0TWtR09vKiSRpktUmQIgEWXOSZHwuSfMxXpOqaVbazYNZ33n+Q5BYQXMkJb2LRsCQe4zg96W40qyubOC0lt1+z28kckMaZRUaNgyYAxwCo46cVfM3Lmfdfnr+X3GbiuTlXZ/lY8zu9HuG8Lap/wjujvY6DPqkMi6fLpcmDbqiiVvsYaNyhcZMfylwGO1g2G2vDOmW1p4A1yK5hmvtNn85v7Ms9EuNN2xmIB4YbeVt43HcRggFnOMV3tFT0a7/8D/ItPVPsVNJWFNFsltbeW1gW3jEcEwIeJdowrAknIHB5PSuc8cWsNxdaQ+saZNqmhRSSG9tYrVroFymImeFQzSKDngK2CVbHy5HXUUS1dyYrlVjyb+yrKKPRW13QNQl0FZ79rewGnXF0IYWZDCkkCKxVcAsEcYX5RhSoA2l8JWE/wvaDxHo1rdPZwXb2UV9bJK1nEzO0SLkHaVTy146bQO1d/WVrXhvTvEKxpqoupIkBUwxXs0McqnGVkRHCyA4xhwRjI7molG8HFdf8rfeXF2kn/X/DHnWvaZdXek+FTfWUFzpUekIhS60GfVkjnKJyYInVlbaCA5VgPmGV3fNpXmlwRweG18WWl74j0S300xkPpU1xm5+TbJLbYeQNsDAFlJU7skFufR1VUQIihVUYAAwAKWtZO7v5t/ff/PQzhHlil2Vvy/y1PP8AxV4d8Ny6joGs33hSG+sIo2glC6KbiSOMx/ug0IjLhVIxjb8pPQc13doIRZQC1i8mARr5cflmPYuOBtIBXA7YGKloqe47BRRRQMKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigD//Z)  
For more details refer to [Creating a Pandas Series](https://www.geeksforgeeks.org/creating-a-pandas-series/)

**Accessing element of Series**

There are two ways through which we can access element of series, they are :

* Accessing Element from Series with Position
* Accessing Element Using Label (index)

**Accessing Element from Series with Position :** In order to access the series element refers to the index number. Use the index operator [ ] to access an element in a series. The index must be an integer. In order to access multiple elements from a series, we use Slice operation.

Accessing first 5 elements of Series

|  |
| --- |
| # import pandas and numpy  import pandas as pd  import numpy as np    # creating simple array  data = np.array(['g','e','e','k','s','f', 'o','r','g','e','e','k','s'])  ser = pd.Series(data)      #retrieve the first element  print(ser[:5]) |

Run on IDE

**Output :**  
![Table

Description automatically generated](data:image/jpeg;base64,/9j/4AAQSkZJRgABAQEAYABgAAD/4RD6RXhpZgAATU0AKgAAAAgABAE7AAIAAAAQAAAISodpAAQAAAABAAAIWpydAAEAAAAgAAAQ0uocAAcAAAgMAAAAPgAAAAAc6gAAAAgAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAEFiaGlzaGVrIFRpd2FyaQAABZADAAIAAAAUAAAQqJAEAAIAAAAUAAAQvJKRAAIAAAADMDcAAJKSAAIAAAADMDcAAOocAAcAAAgMAAAInAAAAAAc6gAAAAgAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA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olJicoKSo0NTY3ODk6Q0RFRkdISUpTVFVWV1hZWmNkZWZnaGlqc3R1dnd4eXqDhIWGh4iJipKTlJWWl5iZmqKjpKWmp6ipqrKztLW2t7i5usLDxMXGx8jJytLT1NXW19jZ2uHi4+Tl5ufo6erx8vP09fb3+Pn6/8QAHwEAAwEBAQEBAQEBAQAAAAAAAAECAwQFBgcICQoL/8QAtREAAgECBAQDBAcFBAQAAQJ3AAECAxEEBSExBhJBUQdhcRMiMoEIFEKRobHBCSMzUvAVYnLRChYkNOEl8RcYGRomJygpKjU2Nzg5OkNERUZHSElKU1RVVldYWVpjZGVmZ2hpanN0dXZ3eHl6goOEhYaHiImKkpOUlZaXmJmaoqOkpaanqKmqsrO0tba3uLm6wsPExcbHyMnK0tPU1dbX2Nna4uPk5ebn6Onq8vP09fb3+Pn6/9oADAMBAAIRAxEAPwD6RooooAoXWu6TY6lb6de6pZW19df8e9rNcIks3OPlQnLc+lX68b8XNeTal4v0WW+tdPub6WKawhZPMvNSxCnlLBu+VVSVDkqHIyx/dnDH2NAwjUOctgZI9aa+FMHvb+v6YtFFFIAoorxzw1q4134iWkM+sXUN/b6jePdQv4gHl3UalxFElmk+5So2sQ0S8I27cTmhauwPSNz2OiiigAooooAKKKKACiiigAooooAKK43X9Oij+I3hfUGeWSeW5njXzHJWJBbSfKi9FyeSepOMkhVA7KgV9QooooGFcvZ+BoLW4tfN1jU7qxspzcWunTNCIYXySp3LGJG27jgO7dickA11FedeG9d8Vazr0F9Hb6nJps15PDcpKLEWkESF1GzZIbjzAyqDvzkl/lXjaK3Mgfws9FooooAKKKKACiiigAooooAKKKKAMfUPCHhrVtQ+36r4e0q9vOP9IubKOSTjp8zKTxWxXFeL4WTXdO/snUtR/t65uYjb2sd44gS3R1M7PCDsKbNwLOpO51AOdoHa0LYHuFFFFABWYPDWhLrh1pdF04aqTk34tE8/7u3/AFmN33eOvTitOuA0Xxzquq+I7dEtHl026uZYBGmjXkZt0Xdtla6YeS4JQZUBcb+Gbb8wt7B0ud/RRRQAUUUUAFFFFABRRRQAUUUUAc/eeCNFvden1mQajFf3Cokstrqt1bh1T7qlY5FXAyeMdz6mugrjvFmo3uk61ZTWer6lGZZoVNm9kjWAjMgWRpJ/KyjbSSAZRlgoAOcHsaFqge4UUUUAFY1p4U0qw1dtRslvLeVpGkMMV/OtuXbO5vs4fyskkk/Lyx3dea2a8+8A+LLnVTPpVqG1Kez1G9Go3M9yQLRPtUwijGQxd9oGE4AUckfKGaXYHtqeg0UUUgCiiigAooooAKKKKACiiigDE1Xw2dYvN17rOoHT2KmTS0EKwSbTnDN5fm4JAJG/B6HgkHbrlPEniq80/W7Kw0mCGVVubZNQlmRisaTSiNUXBHznJbuAF5HzCuroW1we9gooooAK5uw8Eafpd5bXenXV5b3EM08jyoyZuEllaVoZAVwUDuSuMMvZuWz0lYml+JRrGq3NtZaXetaW00kD6izQiEyRnayBfM8zIbI5QDjOcEEtbg9jbooopAFFFFABRRRQAUUUUAFFFFAHI658N9J1i4kuEudSs5572K7nMOqXSpIyMpP7tZQqkqgAYDK8EdK61VCIFGcKMDJJP5nrXM+KvGlroEUtvbebPqKeV8iWc00cYdwo8x0XbHkZI3MtE3jqxg8XS6DLZaoXjiR/Oi0u6kUszFcZWIrt4Hz529Rng0k1pBf1/VgfWTOnorMk8R6VFaXNzJd7YrW6FpMTG2VmLKoTbjJJLrjA5yD0qqnjTQZNYGmR3jtcfaDasVtpTEkwz+7aXbsVzjhWYE5GAcjLWuwdLm7XJQeDbn/hOE8RXd1piSRs5zp2mG2uLhSu1Y55jK3moBg42j5kU8YxWonizRn1z+yVuZPtPmmEMbaUQtIF3GMTFfLLgA/KG3cHjg1ch1ixuNautJin3X1pFHNNFsYbEcsFOcYOdjdD2oT6oH2ZdoorAt/GejX91JaWNxK1xskaEy2kscVxs+95UjKElA/2GPHPTmk2khpXN+iuX8J+OdO8R6bZHzj9umsUunRLaVY5PlXf5TMMSBWYA7C2CQDzS6L4tTV/EWqQCQQ2NnawzKl3Y3NpcJuMm5nEyKpT5Bgr6NntVNWbTJi+ZXR09FZGk+KtI1szCxnlBhjErC5tpbfdGc4kXzFXenH3lyvvVeDxnpN3p1zfWS6jcW9ugfzI9Kuisyk4DRHy/wB6D1ym4Y56c0norjWuxv0VgeEPFtt4u0W3vre0vbV5LeOaSO4s5okUuucJJIirIB6rkdD3Fb9Npp2YBRRRSA4jVvDGvz3Wt22mtposNXuYrt57iSTzYmRIlaMRhcEERAh94xuPynHOvqFhrEHiyLVtHgsbqKa1W1uY7q5eBowrlg6FY33HDNlTt6DnrXQUUrap9v8AK35A9b36nDQRW2s/Ey4Ol3UF3p1uEuNQELB1jvo8xohI43beSvVTFGTjIqrpWmavrc11aNFZW+kW/iGW7a5Fy7XEhin3hBHsCqC4GW3twD8vPHodFEdGmun53Tv+AS1TX9Ws1b8TgNO8C3lj4k33UC39guoSXsVw+v3qGMs5kX/Q8GElWbGdwBxnAPFdlD/an9tXX2j7H/ZflR/Ztm7z/My3mb8/LtxsxjnrntV2insrA9XcbLGJoXjbIDqVJHvXD6V4T11LfRNN1NtPSx8PxslrPbSsZLsiFoELxmMCIbHJIVn5xg4691RR0a7/ANfqO9jivDuiaxYLpE3icaXZW+gaebeNrW7ebzSUVWkdnjjEahUPHzZ3ZyNvNOGOw8c+IPFf9j6lDc6deaNBppv7OQSxrKTOWCspwSqyISAf4hXoNFNu7bfUUfcVo+X4W/yOB0zwJcTWOp2utWwgku9OksFvU1+81Btsgw2I7gARjgHAZumM966XRF137M1rr1np0CRxrHHNY3byGXAwSUaJfL7HG5+uM8ZOzRSeqs/6/q4LTb+tv8kc/wCDtP1jRtEt9H1aCxEGnwR21tc2ty7tcKg2hnjaNRGcAHAZ+SeeOegoopttu7A//9k=)  
   
**Accessing Element Using Label (index) :**  
In order to access an element from series, we have to set values by index label. A Series is like a fixed-size dictionary in that you can get and set values by index label.

Accessing a single element using index label

|  |
| --- |
| # import pandas and numpy  import pandas as pd  import numpy as np    # creating simple array  data = np.array(['g','e','e','k','s','f', 'o','r','g','e','e','k','s'])  ser = pd.Series(data,index=[10,11,12,13,14,15,16,17,18,19,20,21,22])      # accessing a element using index element  print(ser[16]) |

**Output :**

o

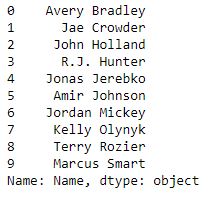
For more details refer to [Accessing element of Series](https://www.geeksforgeeks.org/accessing-elements-of-a-pandas-series/)

**Indexing and Selecting Data in Series**

Indexing in pandas means simply selecting particular data from a Series. Indexing could mean selecting all the data, some of the data from particular columns. Indexing can also be known as **Subset Selection**.

**Indexing a Series using indexing operator [] :**  
Indexing operator is used to refer to the square brackets following an object. The [.loc](https://www.geeksforgeeks.org/python-pandas-extracting-rows-using-loc/) and [.iloc](https://www.geeksforgeeks.org/python-extracting-rows-using-pandas-iloc/) indexers also use the indexing operator to make selections. In this indexing operator to refer to df[ ].

|  |
| --- |
| # importing pandas module  import pandas as pd    # making data frame  df = pd.read\_csv("nba.csv")    ser = pd.Series(df['Name'])  data = ser.head(10)  data |

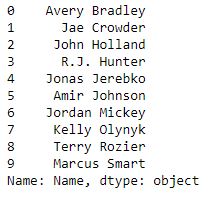
  
Now we access the element of series using index operator [ ].

|  |
| --- |
| # using indexing operator  data[3:6] |

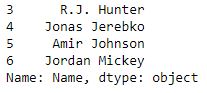
**Output :**  
![Text, letter

Description automatically generated](data:image/jpeg;base64,/9j/4AAQSkZJRgABAQEAYABgAAD/4RD6RXhpZgAATU0AKgAAAAgABAE7AAIAAAAQAAAISodpAAQAAAABAAAIWpydAAEAAAAgAAAQ0uocAAcAAAgMAAAAPgAAAAAc6gAAAAgAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAEFiaGlzaGVrIFRpd2FyaQAABZADAAIAAAAUAAAQqJAEAAIAAAAUAAAQvJKRAAIAAAADODEAAJKSAAIAAAADODEAAOocAAcAAAgMAAAInAAAAAAc6gAAAAgAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA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olJicoKSo0NTY3ODk6Q0RFRkdISUpTVFVWV1hZWmNkZWZnaGlqc3R1dnd4eXqDhIWGh4iJipKTlJWWl5iZmqKjpKWmp6ipqrKztLW2t7i5usLDxMXGx8jJytLT1NXW19jZ2uHi4+Tl5ufo6erx8vP09fb3+Pn6/8QAHwEAAwEBAQEBAQEBAQAAAAAAAAECAwQFBgcICQoL/8QAtREAAgECBAQDBAcFBAQAAQJ3AAECAxEEBSExBhJBUQdhcRMiMoEIFEKRobHBCSMzUvAVYnLRChYkNOEl8RcYGRomJygpKjU2Nzg5OkNERUZHSElKU1RVVldYWVpjZGVmZ2hpanN0dXZ3eHl6goOEhYaHiImKkpOUlZaXmJmaoqOkpaanqKmqsrO0tba3uLm6wsPExcbHyMnK0tPU1dbX2Nna4uPk5ebn6Onq8vP09fb3+Pn6/9oADAMBAAIRAxEAPwD6RrhdZ0qDTfH+k6tHo+m2Kz3ojfULNgLy8d4nHlyLsXMefmJ3uf3YO0YJHdVm2/h3RLPWJdWtNH0+DUpsiW8itUWaTPXc4G45wOp7UdUw6NGlRRRQAUUUUAFZHiz/AJEzWv8Arwn/APRbVr0yWKO4heGeNZYpFKujqCrA8EEHqKiceaDj3Ki+WSZ578O9NTTfEl9GdK0/QZP7Otj9g0wkw3CksftG7YgL5yhGzIwMsQwx2xudI1vSZszWOoadLugm+dJYX52sjdQeeCD34qx9htPtUVz9lh8+GMxRS+WN0aHGVU9QDtXIHHA9Kjt9K0+1sZLK1sLaG0kLl7eOFVjcuSWyoGDkk59c1pJ3/H8/6/4YiKt/Xkct4G07T9I8ReMLXSLO2sbKLUYQsVrEscaH7JCWwFAAOTk/Wutsb+01Ozju9NuoLu2kBKTW8gkR8HHDDg8imafpdhpNgljpVjbWVomdtvbQrHGuTk4VQAMkk0+xsLTTLOO0021gtLaMEJDbxiNEyc8KOByaQ3qcz4/e7ji0BtOghnuhrMPlxTzGJGOx+C4ViP8Avk1hadqmsWvjTUP7QitbG4utYtIJ4rW4NwjRm1YgB3jQ5JUfwj616LNbQXJjNxDHKYnEke9A2xh0YZ6Hk8+9VrzRNK1GC5h1DTLO6iuypuI57dHWYrjbvBHzYwMZ6YqeVr77/l/kN6v5W/P/ADONn8Q6rqVwlvpOsxwrN4lk077RFDHLshW2ZmVcjG4OpwTnDDkMAVOf4gj1TUfB6peeIb1JNO8Qw2rXMcNupnX7ZEEeQGIqGQEfdCqSOQQcV6JBo+mW0cSW2nWkKQyebEscCqEfbs3DA4O35cjtx0p8um2M1ncWs1lbyW11u+0QvEpSbd97cuMNnvnrVrRp9rferf5P7wT2+f4t/wCa+45HxPe6zokWi6NY3+r39xfTSh7yBLEXbhFLBF80Rwg/8BJ2o3GcsIUvPF1zH4d0+7uX0i6u5LpLuSWKCSdoUB8twFLRrKRtJxlASflIwK6k+GNAOiDRjoemnSwdwsTaR+QDndny8bevPTrViz0jTdPgtobDT7W1itQwt44YFRYQ33goA+XPfHWk9mJjNEh1K20mKHW7pLu8jZ1a4QAeaoY7GYBVAYrt3AADOccVfoooAKKKKACiiigAooooAK8sfx5puo/EbS5F8VWMFql/LYR6emoqpkAikDSSx7urShVQEfwgj79ep1XuLC2u7q0uLiPfLZyGSBtxGxipQnA6/KxHPrQtHcT1VkWKKKKBhQRkEHv6GikZQylWAIIwQR1oA4Nnh8G+KNYmiuNTubG10I3729zqU9zlldySvnO20kLjjAqWXxL4i0cE6y+k3JutKuL61W1hkjMDxKrFG3SN5q/OPnGzp935uOj07w1pWltdNbW7u12AszXM8lwWQZxGDIzEIMnCDCjJwOarWXgvQrCO5SC2nZLm3Nqyz3k0wSE9Y497nyl/2U2jgegxFpctk9bP9f8ANfcVdc13/W3+T+8yrXxPq9hNcHxNNpMUDaUdSiaFZI0tgpwySOzHePmXDBV6H5elVtC8Y61fnXbQW66ne2Fil3aY0u40vz2fzAIzHcEnrGPnBwd2ONvPU3vhzStQjeO8tBKr2bWTAyMP3LYJXg8dBz1GODVWy8G6Np4vDapeLNewrBPcvqNw87opYqPNZy4I3tgggjpngVo7a/P83b8LExut/L9L/qReD9bn1mzn+338NzdxOu+FdKn0+SAEZAeKZ2fnnDcA44zg1t3tnFqFlLaztMkcowzQTvC4+joQy/UEVU0fw/p+hCc2C3DSXBBlmuruW5lfAwAZJWZsDnAzgZOByat31lBqNlJa3QcxSDB8uRo2HcFWUhlIPIIIIIyDSlZijdbnn9trc/hbQ9fS2mu7t4tcFlZm8a5v2iDxxHoC0sgXLNtByemVzkWIfGXiJ9GUxafFNenVYrKOa6sLnT47iN1BMgjmy6bckHlgdvB5wOo/4RXR/wCwW0ZrRns3fzG3zSNKZN27zPNLb/MDYIfduBAIPApbXw1p1paxQD7ZcJDcC6jN5fz3LLIBgENI7Nj/AGc49qNbK/l9ytf77P7w6O3n+N7fp9xz2reJvEOgaXHBqqWx1G51A2tteWumz3EUkXl+YZfs0TvJkBWTbvHI3ZArOm1fXNbPhmWOCK11FNWuIFmvLGe3jdRbS4mEEmJMEH7hYcgjfj5q7rV9Gsdcs1ttSiZ0SQSxvHK8UkTjoySIQyNyRlSDgkdCaoXHg7SbrTrSyuG1J0s5TNBL/a10J0cggnzhJ5hGGIwWxg0Lz/rb/g/f9xJXVl/X9fp634nxB4wn08aDqut23n3Gm6ne2032KNhHKUhkUOMk+WmMFixIT5sk4zXSzar4ja80zRYLrSI9UvLea9lujayS26RIyKERPNVnOZV+fcBhSdoyANqDw1pFtFYRw2aquns72+XYkM4YOzEnLs25iS2SSSTzzVNvA+gnT7Wyjt7mCKzZmtmt76eKSAN1RJEcOsfQbAQvA44GDrr/AF/T1/AOv9f15fiWPC2sS65oEd3dJGlwk01vMISShkilaJiuedpKEgHkA1sVBY2NtptjDZ2MSw28CBI0XsB/P6nk1PTe4IKKKKQwooooAKKKKACuJtdVlXxvPBq2va1aA3pitbKTTUjspl2DaouGt/mYnJwJckjHtXbViSeGjc6yl9qGsahewQzefBYS+SsEMg+6w2Rq7Y5wHZhnnGQCBfFf+ugP4dDbooooAKKKKAGySLFG0kjBUQFmJ7AVwNh4y1Gw0nU9T1ZZLxZNOOs2FuQkZEO5h5IIA5C+USWycydcdO11XT49W0i706eSSKK7heF3iIDhWGDgkHBwa5y5+GHhV1P9m6Xb6OzW8ttK+mW8UDTRyLgq5C/NjAI9x9QRb6/1/Wn4ie2n9f1qR6T411PUtak0ubQobWfZdCFjf70klgaMFSRHlVIlT5sEghhtIAZoNF1640T4a6vrN7DdXlxp0988tvLfG5ZmjmcFElManb8uFBUYGBW0PCFrHqD31rfXltdEXOyWMxkxmcxlmAZCMgxLjII65BqtZeBo7XQdU0i51zVL+11PzTJ9oFurRtIzNIyGOJeSWJ5yB2Apx+FX3tr6lO1tO/4a/wDA/Eu6JrGq399PBq+htpiiGOe3kE/nB1YsNjkKAsi4GVBcfMMMa1L23lu7KWCC8mspHGFuIAheP3AdWX81NTgYGKgvrVryykgjuZ7R3Hyz25AeM9Qw3Ag89iCD0II4pMSON0zxDqel2OqW91PPrt7FrX9nWP2nyoWkLRow3tHGFVRl2LBCcDgE4Bj1TxPrTtZ250z7Pq1rq8UEtpbX26GdXhdlPmlVOzoWymRtOFb5c7f/AAhlkdFaxe8vWuWuvtp1HeguPtAPEvChMgADbt24GCpGRTrPwfaWzRzT3t7e3i3q3st3cMnmTSLGY1DBUVQoU4AVV6Z6kkrXS/S34Wv+T/rYXX5/je36Ge3jXUEsbZDocb6rNqr6W9rFfZijkEbyB/NZASm1VJ+UMATgMQAWXvjyfT/DH9oXmnWttdJqDWE63F8UtLdlJ/ePceWSsZAGGKfedQQM5Gz/AMItZfbUuvNuN6ak2pAblx5phMWOn3dpJx1z37US+HHW2ni0zWtQ0tri7e6kltlgdiW6r+9icbe/TPHWn29Px0/4I9Pz/W3/ALaVJ/E96bbSIdNsrC+1PVIWnjSPUG+yCJApZxOIiWX50AwnO4dBkiqnjPUbpLC2sNBSTU7p7mGWCa9CRW8kDBXzIEYshzwQpPK5UZO2yngWxt9NsYNOv76xurF5ni1CAxmYtMxabIZGjIdjkjZgHG0LgYt6b4VsdLksZIJJ3lsxOTJIylp3mYNJJJgDLFhnjA5OBjAA93b+v6/MXRf1/XQs+H9WOuaDbag8H2aSVSJId+/y3VirqGwNwDAgHAz1wK0qp6TpcOjaallatI8aO7gyEE5dy56Ad2NXKBK9tQooooGFFFFABRRRQAVwdh451Ke1uftUFqk6a0tpCFVtr2zXZt933s7xsbPb7pxziu8rj5fAW+305I9S8t7PVZL938jPmxvcm4MON3HzbPm5+705pxtdX7r7rhLWDtv0+5/8A1Z/EwtdcgsLrSdRit7ib7PDqLLH5DybSduN/mDO0gMUCk9DyCcmw+Jem6hqEFtHpmqxLO0IWeWFFQLKWVGPz5wXRl6ZyM42/NVKL4YqvixNalvLCR49Ra+Wc6WpvXzu/dPclySgDYUKq4CqOQMG1afDwWzW5bU94hjskI+z43fZ5ZH/AL3G7zce2O+amN9L/wBbf8EJbS5e2nm/619fuNTTPGFtqeoW8C6ffW1veBjY3s6xiG82jJ2YcuMqCw3quQCRmtOz1L7ZqF/a/YruD7FIqedPFtjn3KGzG2fmAzgn1BFct4V+HNr4V1SOa0t9BaC3RkgmTRVivgDwN9yJMMccE7AW785J6mztb6HUL+W71D7TbzyK1rb+QqfZlCgFdw5fLAtk9M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 
   
**Indexing a Series using**[**.loc[ ]**](https://www.geeksforgeeks.org/python-pandas-extracting-rows-using-loc/)**:**  
This function selects data by refering the explicit index . The df.loc indexer selects data in a different way than just the indexing operator. It can select subsets of data.

|  |
| --- |
| # importing pandas module  import pandas as pd    # making data frame  df = pd.read\_csv("nba.csv")    ser = pd.Series(df['Name'])  data = ser.head(10)  data |

  
Now we access the element of series using .loc[] function.

|  |
| --- |
| # using .loc[] function  data.loc[3:6] |

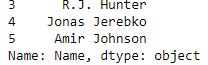
**Output :**  
  
   
**Indexing a Series using**[**.iloc[ ]**](https://www.geeksforgeeks.org/python-extracting-rows-using-pandas-iloc/)**:**  
This function allows us to retrieve data by position. In order to do that, we’ll need to specify the positions of the data that we want. The df.iloc indexer is very similar to df.loc but only uses integer locations to make its selections.

|  |
| --- |
| # importing pandas module  import pandas as pd    # making data frame  df = pd.read\_csv("nba.csv")    ser = pd.Series(df['Name'])  data = ser.head(10)  data |

![Text, table

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confidence](data:image/jpeg;base64,/9j/4AAQSkZJRgABAQEAYABgAAD/4RD6RXhpZgAATU0AKgAAAAgABAE7AAIAAAAQAAAISodpAAQAAAABAAAIWpydAAEAAAAgAAAQ0uocAAcAAAgMAAAAPgAAAAAc6gAAAAgAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAEFiaGlzaGVrIFRpd2FyaQAABZADAAIAAAAUAAAQqJAEAAIAAAAUAAAQvJKRAAIAAAADOTAAAJKSAAIAAAADOTAAAOocAAcAAAgMAAAInAAAAAAc6gAAAAgAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA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 
Now we access the element of Series using .iloc[] function.

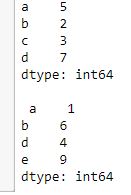
|  |
| --- |
| # using .iloc[] function  data.iloc[3:6] |

**Output :**  


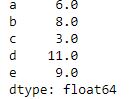
**Binary Operation on Series**

We can perform binary operation on series like addition, subtraction and many other operation. In order to perform binary operation on series we have to use some function like .add(),.sub() etc..  
**Code #1:**

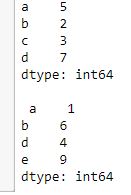
|  |
| --- |
| # importing pandas module  import pandas as pd    # creating a series  data = pd.Series([5, 2, 3,7], index=['a', 'b', 'c', 'd'])    # creating a series  data1 = pd.Series([1, 6, 4, 9], index=['a', 'b', 'd', 'e'])    print(data, "\n\n", data1) |

  
Now we add two series using .add() function.

|  |
| --- |
| # adding two series using  # .add  data.add(data1, fill\_value=0) |

**Output :**  
  
**Code #2:**

|  |
| --- |
| # importing pandas module  import pandas as pd    # creating a series  data = pd.Series([5, 2, 3,7], index=['a', 'b', 'c', 'd'])    # creating a series  data1 = pd.Series([1, 6, 4, 9], index=['a', 'b', 'd', 'e'])    print(data, "\n\n", data1) |

  
Now we subtract two series using .sub function.

|  |
| --- |
| # subtracting two series using  # .sub  data.sub(data1, fill\_value=0) |

**Output :**  
A close-up of a calculator

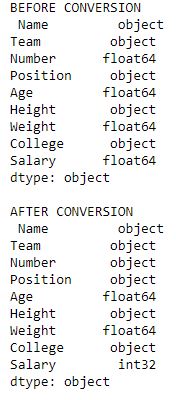
Description automatically generated with low confidence  
For more details refer to [Binary operation methods on series](https://www.geeksforgeeks.org/python-pandas-series/#Basics5)

**Conversion Operation on Series**

In conversion operation we perform various operation like changing datatype of series, changing a series to list etc. In order to perform conversion operation we have various function which help in conversion like .astype(), .tolist() etc.

**Code #1:**

|  |
| --- |
| # Python program using astype  # to convert a datatype of series    # importing pandas module  import pandas as pd    # reading csv file from url  data = pd.read\_csv("nba.csv")    # dropping null value columns to avoid errors  data.dropna(inplace = True)    # storing dtype before converting  before = data.dtypes    # converting dtypes using astype  data["Salary"]= data["Salary"].astype(int)  data["Number"]= data["Number"].astype(str)    # storing dtype after converting  after = data.dtypes    # printing to compare  print("BEFORE CONVERSION\n", before, "\n")  print("AFTER CONVERSION\n", after, "\n") |

**Output :**  
  
   
**Code #2:**

|  |
| --- |
| # Python program converting  # a series into list    # importing pandas module  import pandas as pd    # importing regex module  import re    # making data frame  data = pd.read\_csv("nba.csv")    # removing null values to avoid errors  data.dropna(inplace = True)    # storing dtype before operation  dtype\_before = type(data["Salary"])    # converting to list  salary\_list = data["Salary"].tolist()    # storing dtype after operation  dtype\_after = type(salary\_list)    # printing dtype  print("Data type before converting = {}\nData type after converting = {}"        .format(dtype\_before, dtype\_after))    # displaying list  salary\_list |

**Output :**  
![Table

Description automatically generated](data:image/jpeg;base64,/9j/4AAQSkZJRgABAQEAYABgAAD/4REGRXhpZgAATU0AKgAAAAgABQESAAMAAAABAAEAAAE7AAIAAAAQAAAIVodpAAQAAAABAAAIZpydAAEAAAAgAAAQ3uocAAcAAAgMAAAASgAAAAAc6gAAAAgAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAEFiaGlzaGVrIFRpd2FyaQAABZADAAIAAAAUAAAQtJAEAAIAAAAUAAAQyJKRAAIAAAADMTAAAJKSAAIAAAADMTAAAOocAAcAAAgMAAAIqAAAAAAc6gAAAAgAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA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**Python | Pandas DataFrame**

**Pandas DataFrame** is two-dimensional size-mutable, potentially heterogeneous tabular data structure with labeled axes (rows and columns). A Data frame is a two-dimensional data structure, i.e., data is aligned in a tabular fashion in rows and columns. Pandas DataFrame consists of three principal components, the **data**, **rows**, and **columns**.

Diagram, table

Description automatically generated

We will get a brief insight on all these basic operation which can be performed on Pandas DataFrame :

* [Creating a DataFrame](https://www.geeksforgeeks.org/python-pandas-dataframe/#Basics)
* [Dealing with Rows and Columns](https://www.geeksforgeeks.org/python-pandas-dataframe/#Basics1)
* [Indexing and Selecting Data](https://www.geeksforgeeks.org/python-pandas-dataframe/#Basics2)
* [Working with Missing Data](https://www.geeksforgeeks.org/python-pandas-dataframe/#Basics3)
* [Iterating over rows and columns](https://www.geeksforgeeks.org/python-pandas-dataframe/#Basics4)

**Creating a Pandas DataFrame**

In the real world, a Pandas DataFrame will be created by loading the datasets from existing storage, storage can be SQL Database, CSV file, and Excel file. Pandas DataFrame can be created from the lists, dictionary, and from a list of dictionary etc. Dataframe can be created in different ways here are some ways by which we create a dataframe:

[**Creating a dataframe using List**](https://www.geeksforgeeks.org/create-a-pandas-dataframe-from-lists/)**:** DataFrame can be created using a single list or a list of lists.

|  |
| --- |
| # import pandas as pd  import pandas as pd    # list of strings  lst = ['Geeks', 'For', 'Geeks', 'is',              'portal', 'for', 'Geeks']    # Calling DataFrame constructor on list  df = pd.DataFrame(lst)  print(df) |

**Output:**  
A screenshot of a phone

Description automatically generated with medium confidence

**Reference:**

https://www.geeksforgeeks.org/python-pandas-series/#:~:text=Pandas%20Series%20is%20a%20one,must%20be%20a%20hashable%20type.

# Activity 9

**Aim**:Grouping, Merging, concatenating, joining, segregation

**Learning outcome:** Able to install and different operation in python

**Duration:** 3.5 hour

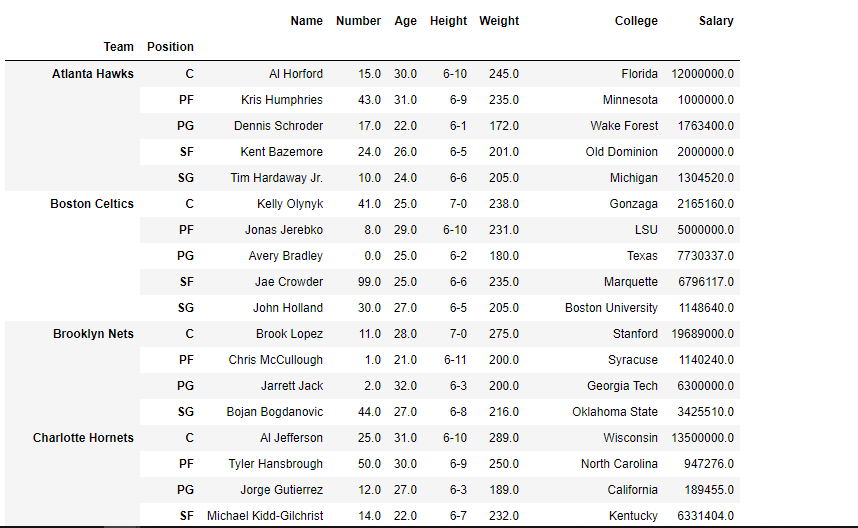
**List of Hardware/Software requirements:**

1. Laptop/Computer with Windows 10/11
2. Internet connection
3. Python

# Program / Procedure :

Use groupby() function to form groups based on more than one category (i.e. Use more than one column to perform the splitting).

|  |
| --- |
| # importing pandas as pd  import pandas as pd  # Creating the dataframe  df = pd.read\_csv("nba.csv")  # First grouping based on "Team"  # Within each team we are grouping based on "Position"  gkk = df.groupby(['Team', 'Position'])  # Print the first value in each group  gkk.first() |

**Output :**  


groupby() is a very powerful function with a lot of variations. It makes the task of splitting the dataframe over some criteria really easy and efficient.

**Pandas DataFrame merge() Method**

import pandas as pd  
  
data1 = {  
  "name": ["Sally", "Mary", "John"],  
  "age": [50, 40, 30]  
}  
  
data2 = {  
  "name": ["Sally", "Peter", "Micky"],  
  "age": [77, 44, 22]  
}  
  
df1 = pd.DataFrame(data1)  
df2 = pd.DataFrame(data2)  
  
newdf = df1.merge(df2, how='right')

**output:**

name age

0 Sally 77

1 Peter 44

2 Micky 22

**Concatenating 2 DataFrames horizontally with axis = 1.**

# importing the module

import pandas as pd

# creating the DataFrames

df1 = pd.DataFrame({'A': ['A0', 'A1', 'A2', 'A3'],

                    'B': ['B0', 'B1', 'B2', 'B3']})

display('df1:', df1)

df2 = pd.DataFrame({'C': ['C0', 'C1', 'C2', 'C3'],

                    'D': ['D0', 'D1', 'D2', 'D3']})

display('df2:', df2)

# concatenating

display('After concatenating:')

display(pd.concat([df1, df2],

                  axis = 1))

**Output:**

A screenshot of a computer

Description automatically generated with medium confidence

#### **Joining DataFrame**

In order to join dataframe, we use .join() function this function is used for combining the columns of two potentially differently-indexed DataFrames into a single result DataFrame.

|  |
| --- |
| # importing pandas module  import pandas as pd    # Define a dictionary containing employee data  data1 = {'Name':['Jai', 'Princi', 'Gaurav', 'Anuj'],          'Age':[27, 24, 22, 32]}    # Define a dictionary containing employee data  data2 = {'Address':['Allahabad', 'Kannuaj', 'Allahabad', 'Kannuaj'],          'Qualification':['MCA', 'Phd', 'Bcom', 'B.hons']}    # Convert the dictionary into DataFrame  df = pd.DataFrame(data1,index=['K0', 'K1', 'K2', 'K3'])    # Convert the dictionary into DataFrame  df1 = pd.DataFrame(data2, index=['K0', 'K2', 'K3', 'K4'])    print(df, "\n\n", df1) |

Run on IDE

Now we are use .join() method in order to join dataframes

|  |
| --- |
| # joining dataframe  res = df.join(df1)  res |

**Output :**  
![A screenshot of a computer

Description automatically generated with low confidence](data:image/jpeg;base64,/9j/4AAQSkZJRgABAQEAYABgAAD/4REGRXhpZgAATU0AKgAAAAgABQESAAMAAAABAAEAAAE7AAIAAAAQAAAIVodpAAQAAAABAAAIZpydAAEAAAAgAAAQ3uocAAcAAAgMAAAASgAAAAAc6gAAAAgAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAEFiaGlzaGVrIFRpd2FyaQAABZADAAIAAAAUAAAQtJAEAAIAAAAUAAAQyJKRAAIAAAADMjkAAJKSAAIAAAADMjkAAOocAAcAAAgMAAAIqAAAAAAc6gAAAAgAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA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fAkM2JyggkKFhcYGRolJicoKSo0NTY3ODk6Q0RFRkdISUpTVFVWV1hZWmNkZWZnaGlqc3R1dnd4eXqDhIWGh4iJipKTlJWWl5iZmqKjpKWmp6ipqrKztLW2t7i5usLDxMXGx8jJytLT1NXW19jZ2uHi4+Tl5ufo6erx8vP09fb3+Pn6/8QAHwEAAwEBAQEBAQEBAQAAAAAAAAECAwQFBgcICQoL/8QAtREAAgECBAQDBAcFBAQAAQJ3AAECAxEEBSExBhJBUQdhcRMiMoEIFEKRobHBCSMzUvAVYnLRChYkNOEl8RcYGRomJygpKjU2Nzg5OkNERUZHSElKU1RVVldYWVpjZGVmZ2hpanN0dXZ3eHl6goOEhYaHiImKkpOUlZaXmJmaoqOkpaanqKmqsrO0tba3uLm6wsPExcbHyMnK0tPU1dbX2Nna4uPk5ebn6Onq8vP09fb3+Pn6/9oADAMBAAIRAxEAPwD9/KKKKACiiigAooooAMU1oUbqinkHkdx0p1FADfLXP3V656UbFH8K/lTqKAGmNWH3V568dadiiigAxTWiViMqp2nIyOhp1FADSin+FfypQij+Ed+3rS0UAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRSjsAUUUUwCiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooopR2AKKKKYBRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAKNoooopR2AKKKKYBRRRQAUUUUAFFFFABRWF8UPiXonwY+GniHxh4lvf7N8O+FdNuNX1S78mSb7La28TSyybI1Z22ojHailjjABPFO+GvxF0b4v/DvQfFnh28/tHw/4m0+DVdNuvKeH7TbTxrJFJskVXXcjKdrKGGcEA8ULW9ulr+V72++zt3s+wPS1+t7edrX+66v2uu5t0V5b+2J+1z4b/Yn+C7eNfE1lrmq20mp2Oi2WnaPDFJe6le3lwlvbwR+dJFCpaSQfNLLGigElh3tfB79qnwr8ZfiL4j8E2bahpfj7wTp+mah4n8N39vi68PjUIXlt4pZojJaSyFY5A32aeZQUPzYKkkfevy9Hb52T/BNN9rq+6uS037X+V7J+jei7u6WqZ6RRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAAGKKKKUdgCiiimAUUUUAFFFFABRRRQB4z/AMFGfC+p+OP+CfXxz0XRdOvtY1jVvAGu2VjYWVu9xc3s8mnzpHFFGgLO7MQqqoJJIABNfnj+0RdeOfjx/wAEvf2bfAvhLwd8To7P4bal4Qh+K+h6/wDCTxHLHNp0NoYpI30yaOzk1u0ivEha4trKWRjGoYqyDn9dKKmMbOV9U3TfzpuTXyfM01vbZouU7qK/lU18qiin81ypxfR7pn4y/Gb/AIJ5x+MP2A7qx0fw1dfEyzu/jj4f1rTPDEHwL1jwZZ+CbKW6sV1SHTtK1TzriLT5Y1eWZoyLcmWcHA3gfRX7Kf7Hfg39mn/gt18aNU/4UrZ6Dpvirw94dn+HviDSfALtpOmtDZ3kOpxR39vbG30+V8IHR5ImmBQfPlQf0QorSnLkd1/S9nCCV/LkT77p9zKceZNPqkvmqjqX+bdn5bdgoooqSgooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooZtq5PAHUntTfOXj5l+Y4HPUigB1FNEqkZ3Lj1zQsyv8AdZW4B4PY9KAHUHpRSN92gBkv+rIHXFfmz4j+M/jD4d6V8QILrxh4omi8ZfGG0g0WeXU5t+lm18YafZXelwsZWMdtJYyRlLaJQpRL0kfORX6TSp5kRHPIIrynxl+xf8OfiD4ct9J1jw693p1n4rXxvFEdQu08rV1uvtguQyygkeeS/l/6s9ChAxUxuppvY2o1FHmT7Hgfjz/gorq/hv8Aaw0nQNJ1bSfEfhGbxZB4Ov7Gy+HevyLZXcpMbP8A8JOHOk+bFIyF7Pyt64kh8zzRtrh/gh/wUe+NPjD4leF49csfhbH4b1keFLy4gsLG/wDt0dprt7qFhFEkrXHlh45LHzzKY8ESLb+WSPtTfSMn/BOv4Rz/ABQTxjJ4f1htWXXf+Eogt5fFGqyaTY6t5nmNewad9pNnFcu+9nlihVpPMm3lhI+7W8PfsPfC3wrf6d9g8M+U2lxaTBbH+0LpzEulXE91YZLSHLRS3UzZbLOJSGLKMU4XV3Pblf330/A5JKT92G9191tfxPAP2Yv+Ci3j747/AB68Kxr4c1G+8A+NNQvbSGzs/hb4o01vDVrEkslrqM/iG5VdLvY5Ps6I8MEcYVrxPLlnWImX7iY7R9a8j+HX7GngX4T/ABWk8U+GbfxTodzPc3N2+lWni/V4vD5muNzXEq6P9q/s5Gd5GlZhb7jK7yffJc+ukZ4oj8MU97Fy3fKVPEOs2vhvQb3Ur64jtLGwt3ubieRgqQxopZnJPAAAJJPpX5xfsQf8FL/D17f+NtXsfiRpPxW1Lxf4C1H4pw+E9O8Xw6re6BNaXE0j6SYllkWwIsrnS4RCAqGS1uX2BzKW/Q74jfD/AEv4rfD/AFrwzrlvLeaL4gsZ9Nv4Enkt2mgmjaORBJGVkTKsRuRgwzkEEA15Z+19+x7pv7THwIvtBsodP03xNp2i6pp/hbULuKR7TR57zTriwPm26OqTw+VOytE4aM4Rgu5EKx8LuV0Pl/8AZ7/4Kd+OPFei/ETx5qnjX4L/ABY+Gvw/+G0HjK4ufh7oF9atBq83nyHSJbptSvFE0UUALIsHmkXKl4oflSX2D9hT9rL4hfGr4nal4d8aabdajbw6PDq1v4gg+FfibwFaW05lEc1g0Ws7jct8ySJNDL8w8wPBFsVpMn9lP9inx94R+JWqzeOobLTfh/qPhu40K/8ACNz8U/EPxOtPETzsmJpn12CEWccUSTRmG3RvtH2x/MYLEin3T4C/so+EP2apbhfDN546kguo4rcW2veONa8Q29skXCCCLULqdLcDdj9yqbhtByAANoxUbJ9v0/zCrv7p6lRRRUgFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUANmOI2+meK+M/2hv2rPHOh/wDBQC++DHhvXbbTNQ8ZeCNIk8NyXmnqbHSb+W+1cXt+0xQiaZLO0DxWLP8Avnt/lCoJ5o/syRtqMfbvXiPxf/Yd8H/G3x54n8Ra5NrX9peKPDun6AXt544/7NOn3txe2d/anyy0V9DcXPmJNuIRoYmRVIYmNPaK5tRlFP3j51/bB/aZ8daH8bdf+HXhL4i+NLHxZ4B8H6fe6NpmgeHNM1rVfHOqXf2r99qsctp5NppifZIFe4jl06Lfdyq1xEfIC/XX7M/xS/4Xr8APAvjj7GNPPjDQLDXGtlz+4a6gjnZMMB0MnXGT1xnBrzX4l/sBWHxE8U2+vr8RPiRofiC+8Nw+FPFF7pN1p9vL4602FnZY78NaSLFIDPc4n09bWZTdy7HQeWI/cPCnhez8GeHdN0jS7RbHTdJt4rO0t1+5DDGAiKOv3UUAHOT3rW8eS3X+rnL73N/XyNqijcM00SK3Rl/OpNB1I4yh+lAdT3FMmKvEy/KdwI5Gf0o8gPlD483/AI++C37anwPe1+LHjTUPCfxN8X32j6n4Tv8ATdDOl2lvHoOp3kYhkjsEvdy3NrC2WumJXcDkU1P+Cl2maf8Atz6R8Hbpvhfctr2sXOg2kGk/Ea31Lxdp9xBZ3F15uo6KtuPstsy28qrIt1NIDLa+ZGhkkEXqMn7J9nqP7QGnePNa8V+MPETaBPcXvh7QdQks203w5dzwPbz3duUt0unkeKa4jxcTzRxrcusaRptVeD+H3/BNHQ/h/wCP/DurW/j74k3ui+DfFOo+M9A8MTzabHo2lX1+L/7QFENnHcTxk6lcFftVxLIh27XHzbnRaXLGp3d/ToD+N+iJP2cPEHiy/wD+ChXxvsPFSahYfY9C8PXml2Nr4yl1jRPsU0+sQwzx2UlhbfYbuQWhM4EtyrnygGAiBP01jvXgPw7/AGLb/wAA/tV6r8UpvjF8UtevNctodPv9G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FFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFAH//2Q==)  
   
Now we use how = 'outer' in order to get union

|  |
| --- |
| # getting union  res1 = df.join(df1, how='outer')  res1 |

**Output :**  
![Graphical user interface, text, application, email

Description automatically generated](data:image/jpeg;base64,/9j/4AAQSkZJRgABAQEAYABgAAD/4REGRXhpZgAATU0AKgAAAAgABQESAAMAAAABAAEAAAE7AAIAAAAQAAAIVodpAAQAAAABAAAIZpydAAEAAAAgAAAQ3uocAAcAAAgMAAAASgAAAAAc6gAAAAgAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAEFiaGlzaGVrIFRpd2FyaQAABZADAAIAAAAUAAAQtJAEAAIAAAAUAAAQyJKRAAIAAAADMDMAAJKSAAIAAAADMDMAAOocAAcAAAgMAAAIqAAAAAAc6gAAAAgAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA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