Pandas :-

* Powerful open source tool commonly used by data scientists.
* Provides data structures designed to make working with data easy and intuitive.
* Contains functions that enable you to store, manipulate, and analyze data.

Series

A one-dimensional labeled array that can hold any data type.

Create a Pandas Series :-

```
# import relavant libraries
import numpy as np
import pandas as pd.
```

You can create a pandas Series from any of the following :-

* An array-like object
* A python dictionary
* A scalar value.

Create a pandas Series Containing 8 random integers from -10 to 10 inclusive.

```
pd.Series(np.random.randint(-10, 11, size=8))
```

Output:-

```
0    10
1    -9
2    -1
3    -2
4     3
5    -7
6     7
7    -5
dtype: int64
```

Create a pandas Series Containing 8 random integers from -10 to 10 inclusive with index being a through h.

```
pd.Series(np.random.random(-10, 11, size=8),
          index=['a','b','c','d','e','f','g','h'])
```

output:-

```
a   -6
b   -8
c   -6
d    7
e    5
f   -10
g   -1
h    6
dtype: int64.
```

Create a pandas series from a python dictionary

```
pd.Series ( {'mon': True, 'Tue': false, 'wed': True,
             'Thu': false, 'Fri': True, 'sat': false, 'sun': True})
```

output:-

```
Mon    True
Tue    false
wed    True
Thu.   false
Fri    True
Sat    false
Sun    True.
dtype: bool
```

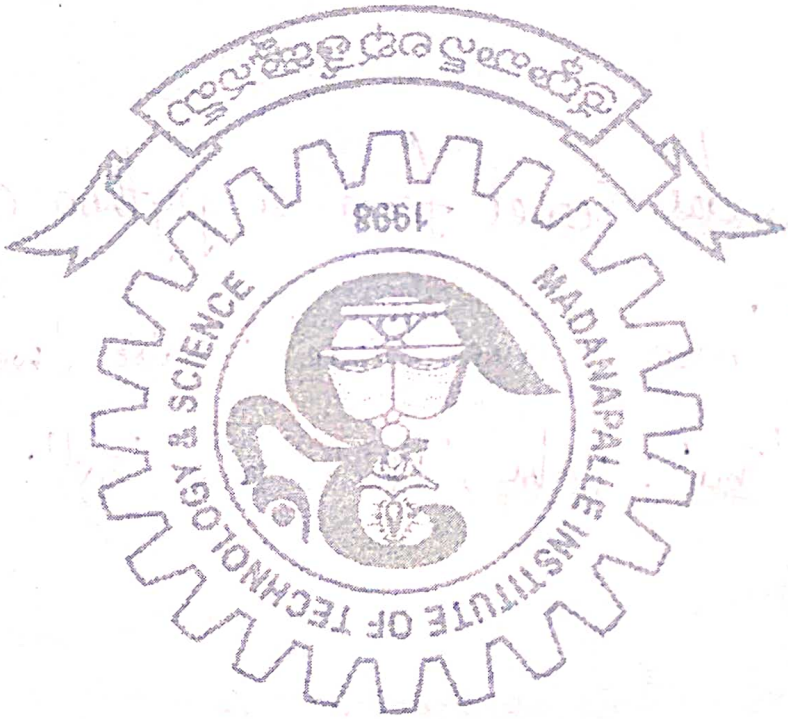
Create a pandas Series from a Scalar value to represent the maximum number of points students can earn in each of 10 exams for a particular course.

```
Pd.Series(150, index=np.arange(1,11))
```

output :-

1	150
2	150
3	150
4	150
5	150
6	150
7	150
8	150
9	150
10	150

dtype: int64



Pandas Library

* powerful open source tool commonly used by data scientists.
* Supports data manipulation and data analysis.

Data frame :-

A 2-dimensional labeled data structure with columns that can hold any data type.

Create a Pandas Data Frame :-

```
#import relevant libraries.
import numpy as np
import pandas as pd.
#read grades.csv into a pandas dataframe & save
 the dataframe in a variable.
grades = pd.read_csv('grades.csv')
#display grades
grades
```

#output:- up to last based on csv file. (large data)

:

display first few rows of grades.

```
grades.head()
```

#output:-

	exam	studentid	grade
0	1	1	86.0
1	1	2	65.0
2	1	3	70.0
3	1	4	98.0
4	1	5	89.0

You call the pandas DataFrame function on any of the following:-

=> A python Dictionary of one-dimensional Numpy Arrays, lists, Dictionaries, or series.

=> A multi-Dimensional Numpy array.

=> A structured or Record Array.

=> A Series

=> Another DataFrame.

#Create a python dictionary of series & save in a variable named points

```
points = {'player1': pd.Series([15,10,20,25],
          index=['game1','game2','game3','game4']),
          'player2': pd.Series([10,15,23,27],
          index=['game1','game2','game3','game4'])}
```

#Create a pandas dataframe from points.

```
pd.DataFrame(points)
```

#output :-

	player1	player2
game1	15	10
game2	10	15
game3	20	23
game4	25	27

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Create a python dictionary of lists & save in a variable named sales.

```
Sales = {'foodTruck1': [216, 275, 203, 210, 315, 402, 380],
         'foodTruck2': [374, 90, 95, 115, 130, 150, 140]}
```

Create a pandas dataframe from sales with index being ~~dat~~ day1 to day7.

```
pd.DataFrame(sales, index=['day1', 'day2', 'day3', 'day4',
                           'day5', 'day6', 'day7'])
```

#Output

	foodTruck1	foodtruck2
day1	216	374
day2	275	90
day3	203	95
day4	210	115
day5	315	130
day6	402	150
day7	380	140.

Create a multi-dimensional numpy array & save in a variable name passangers.

```
passangers = np.array([[20, 40, 60, 80], [15, 30, 45, 60], [10, 20, 30, 40]])
```

Create a pandas Data Frame from passengers. with index being plane1 through plane3 and columns being infants, children, adults, seniors.

```
pd.DataFrame(passangers, index = ['plane1', 'plane2', 'plane3'], columns = ['infants', 'children', 'adults', 'seniors'])
```

output:-

	infants	children	adults	seniors
plane1	20	40	60	80
plane2	15	30	45	60
plane3	10	20	30	40

Select Data Subsets from Pandas Objects

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display first few rows of grades.

grades.head() → top 5 rows will print.

#output:-

	exam	studentid	grade
0	1	1	86.0
1	1	2	65.0
2	1	3	70.0
3	1	4	98.0
4	1	5	89.0

Select exam column and grade column from grades dataframe, result will be a pandas dataframe containing just those columns.

```
grades.loc[:, ['exam', 'grade']]
```

Select exam column from grades dataframe result will be a pandas dataframe containing just that column.

```
grades.loc[:, ['grade']]
```

#Select row 0 from grades dataframe such that result is a pandas Series.

```
grades.iloc[0]
```

#output:-

```
exam          1.0
studentid     1.0
grade        86.0
Name: 0, dtype: float64
```

#Select row 0 from grades dataframe such that result is a pandas dataframe.

```
grades.iloc[[0],:]
```

#output:-

	exam	studentid	grade
0	1	1	86.0

#Select row 0 and row 10 from grades dataframe result will be a pandas data frame.

```
grades.iloc[[0,10],:]
```

#output

	exam	studentid	grade
0	1	1	86.0
10	2	1	79.0

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Select item at row4 column 2 from grades data frame.

```
grades.iloc[4, 2]
```

#output

89.0

Select column 0 and column2 from grades dataframe result will be a pandas data frame.

```
grades.iloc[:, [0, 2]]
```

Select row0 and row2 from grades dataframe.

```
grades.iloc[[0, 2], :]
```

#output:

	exam	student id	grade
0	1	1	86.0
2	1	3	70.0

Seled rows 35 and 45 and columns 0 and 2 from grades dataframe, result will be a pandas data frame.

```
grades.iloc[[35, 45], [0, 2]]
```

#output:-

	exam	grade
35	4	84.0
45	5	94.0

#Select every row from grades dataframe for which entry in grade column is atleast 70.0.

```
grades[grades['grade'] >= 70.0]
```

OR

select all data representing student grades on exam no. 5 that were atleast 70%. in other words, select every row from grades dataframe for which entry in exam column is 5 and entry in grade column is atleast 70.0.

```
grades[(grades['exam']==5) & (grades['grade']>=70.0)]
```

Modify Pandas Objects

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```
#display grades.
grades.

#fill missing values in grade column with zeros
grades['grade'] = grades['grade'].fillna(0)
#display grades
grades
#drop student_id column from grades
grades = grades.drop(columns=['student_id'])
grade

#rename exam column --- change that column's
label from 'exam' to 'exam#'
grades = grades.rename(columns={'exam':'exam#'})
```

Combine Data from Pandas Objects.

```
#display exam1_grades
exam1_grades
#display exam2_grades
exam2_grades
#Merge exam1_grades and exam2_grades on 'SID'
#result will be a new pandas data frame.
pd.merge(exam1_grades, exam2_grades, on='SID')
```

```
#display sid_1_to_7
sid_1_to_7.
#display sid_8_to_10
sid_8_to_10.
#Concatenate sid_1_to_7 and sid_8_to_10 along the rows (along axis=0)
#result will be a new pandas data frame
pd.concat([sid_1_to_7, sid_8_to_10], axis=0)
```

```
#display exam1 and 2
exam1 and 2
#display exam3
exam3
```

#Concatenate exam1 and2 and exam3 the column along (axis;1)
#result will be a new pandas dataframe.

pd.Concat([exam1and2, exam3], axis=1)

Group Data from Pandas Objects :-

#display grades
grades

#drop exam column from grades, group by Student_id, and Compute mean grade for each Student_id result will be a new pandas Data frame.

grades.drop(columns='exam').groupby('student_id').mean()

#drop student_id column from grades, group by exam, and compute mean grade for each exam result will be a new pandas dataframe.

```
grades.drop(columns='student_id').groupby
('exam').mean()
```