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COURSE TITLE : DATA AND VISUAL ANALYTICS LAB

LAB_03- Pandas Indexing and Selection

Simple Series and DataFrames

Import necessary modules

In [1]:
```
import pandas as pan
```

create a series to store Temperature values for 1 week

In [2]:
```
temperature_trichy = pan.Series([40.2,39.8,36.3,39.1,41.3,32.9,36.6])
```

show temperature values

In [3]:
```
temperature_trichy
```

Out[3]:
```
0    40.2
1    39.8
2    36.3
3    39.1
4    41.3
5    32.9
6    36.6
dtype: float64
```

What is the weather on 2nd day?

In [6]:
```
temp_2nd_day=temperature_trichy[1]
temp_2nd_day
```

Out[6]:
```
39.8
```

Find all days and temperatures where temperature over 40.0 degree celsius

In [7]:
```
temperature_trichy[temperature_trichy>40.0]
```

Out[7]:
```
0    40.2
4    41.3
dtype: float64
```

Find only day, not temperature where temperature over 40.0 degree Celsius

In [8]:
```
temperature_trichy[temperature_trichy>40.0].keys()
```

Out[8]:
```
Int64Index([0, 4], dtype='int64')
```

Create a Dataframe for student details from List

In [9]:
```
students = [['DS01', 'Rex', '1msc'], ['DS02', 'peter', '2msc'], ['CS01', 'ann', '3bsc']]
df_stud = pan.DataFrame(students, columns=['rollno', 'name', 'class'])
```

show df_stud dataframe

```
In [10]: df_stud
```

Out[10]:

	rollno	name	class
0	DS01	Rex	1msc
1	DS02	peter	2msc
2	CS01	ann	3bsc

Display all column names of df_stud

```
In [11]: df_stud.columns
```

```
Out[11]: Index(['rollno', 'name', 'class'], dtype='object')
```

Add a new column "address" with values ['Delhi', 'Bangalore', 'Chennai'] to df_stud

```
In [12]: address= ['Delhi', 'Bangalore', 'Chennai']
         df_stud['address']=address
```

```
In [13]: df_stud
```

Out[13]:

	rollno	name	class	address
0	DS01	Rex	1msc	Delhi
1	DS02	peter	2msc	Bangalore
2	CS01	ann	3bsc	Chennai

Create a Dataframe for Phone book from Dictionary

```
In [14]: phonebook = {'rex':[9942002764, 'rex@abc.com'],
                      'sam':[9932176542, 'sam@xyz.com'],
                      'peter':[9865323645, 'ann@bhc.com']}


         df_phonebook = pan.DataFrame.from_dict(phonebook, orient='index')
```

```
In [15]: df_phonebook
```

Out[15]:

	0	1
rex	9942002764	rex@abc.com
sam	9932176542	sam@xyz.com
peter	9865323645	ann@bhc.com

Exploratory Data Analysis on Video Game Review Dataset

Import ign.csv dataset

```
In [16]: reviews = pan.read_csv("ign.csv")
```

```
In [17]: reviews.head()
```

Out[17]:

	Unnamed: 0	score_phrase	title	url	platform	score	genre	editors_choice	release_year	release_month	release_day
0	0	Amazing	LittleBigPlanet PS Vita	/games/littlebigplanet-vita/vita-98907	PlayStation Vita	9.0	Platformer	Y	2012	9	12
1	1	Amazing	LittleBigPlanet PS Vita -- Marvel Super Hero E...	/games/littlebigplanet-ps-vita-marvel-super-he...	PlayStation Vita	9.0	Platformer	Y	2012	9	12
2	2	Great	Splice: Tree of Life	/games/splice/ipad-141070	iPad	8.5	Puzzle	N	2012	9	12
3	3	Great	NHL 13	/games/nhl-13/xbox-360-128182	Xbox 360	8.5	Sports	N	2012	9	11
4	4	Great	NHL 13	/games/nhl-13/ps3-128181	PlayStation 3	8.5	Sports	N	2012	9	11

Show bottom 3 rows

In [18]:

```
reviews.tail(3)
```

Out[18]:

	Unnamed: 0	score_phrase	title	url	platform	score	genre	editors_choice	release_year	release_month	release_day
18622	18622	Mediocre	Star Ocean: Integrity and Faithlessness	/games/star-ocean-5/ps4-20035681	PlayStation 4	5.8	RPG	N	2016	6	28
18623	18623	Masterpiece	Inside	/games/inside-playdead/xbox-one-121435	Xbox One	10.0	Adventure	Y	2016	6	28
18624	18624	Masterpiece	Inside	/games/inside-playdead/pc-20055740	PC	10.0	Adventure	Y	2016	6	28

How many rows and columns here?

In [19]:

```
reviews.shape
```

Out[19]:

```
(18625, 11)
```

What are the datatypes?

In [20]:

```
reviews.dtypes
```

Out[20]:

```
Unnamed: 0          int64
score_phrase       object
title              object
url                object
platform           object
score             float64
genre              object
editors_choice     object
release_year        int64
release_month       int64
release_day         int64
dtype: object
```

Selecting Columns

Select a single column, say title and print head

In [21]:

```
reviews.title.tail()
```

Out[21]:

```
18620                  Tokyo Mirage Sessions #FE
18621           LEGO Star Wars: The Force Awakens
18622    Star Ocean: Integrity and Faithlessness
18623                                     Inside
18624                                     Inside
Name: title, dtype: object
```

Select multiple columns, title and genre and print head

In [22]:

```
reviews[['title','genre']].head(10)
```

Out[22]:

	title	genre
0	LittleBigPlanet PS Vita	Platformer
1	LittleBigPlanet PS Vita -- Marvel Super Hero E...	Platformer
2	Splice: Tree of Life	Puzzle
3	NHL 13	Sports
4	NHL 13	Sports
5	Total War Battles: Shogun	Strategy
6	Double Dragon: Neon	Fighting
7	Guild Wars 2	RPG
8	Double Dragon: Neon	Fighting
9	Total War Battles: Shogun	Strategy

Selection using Positions

Select top-5 rows and all columns, same as head() using iloc

In [23]:

```
reviews.iloc[0:5,:]
```

Out[23]:

	Unnamed: 0	score_phrase	title	url	platform	score	genre	editors_choice	release_year	release_month	release_day
0	0	Amazing	LittleBigPlanet PS Vita	/games/littlebigplanet-vita/vita-98907	PlayStation Vita	9.0	Platformer	Y	2012	9	12
1	1	Amazing	LittleBigPlanet PS Vita -- Marvel Super Hero E...	/games/littlebigplanet-ps-vita-marvel-super-he...	PlayStation Vita	9.0	Platformer	Y	2012	9	12
2	2	Great	Splice: Tree of Life	/games/splice/ipad-141070	iPad	8.5	Puzzle	N	2012	9	12
3	3	Great	NHL 13	/games/nhl-13/xbox-360-128182	Xbox 360	8.5	Sports	N	2012	9	11
4	4	Great	NHL 13	/games/nhl-13/ps3-128181	PlayStation 3	8.5	Sports	N	2012	9	11

Select rows from position 5 onwards, and columns from position 5 onwards.

In [24]:

```
reviews.iloc[4:,4:].head()
```

Out[24]:

	platform	score	genre	editors_choice	release_year	release_month	release_day
4	PlayStation 3	8.5	Sports	N	2012	9	11
5	Macintosh	7.0	Strategy	N	2012	9	11
6	Xbox 360	3.0	Fighting	N	2012	9	11
7	PC	9.0	RPG	Y	2012	9	11
8	PlayStation 3	3.0	Fighting	N	2012	9	11

Select the first column, and all of the rows for the column

In [25]:

```
reviews.iloc[:,0].head()
```

Out[25]:

```
0    0
1    1
2    2
3    3
4    4
Name: Unnamed: 0, dtype: int64
```

The 10th row, and all of the columns for that row.

In [26]:

```
reviews.iloc[9,:]
```

Out[26]:

```
Unnamed: 0                                             9
score_phrase                                        Good
title                         Total War Battles: Shogun
url               /games/total-war-battles-shogun/pc-142564
platform                                              PC
score                                                7.0
genre                                           Strategy
editors_choice                                         N
release_year                                        2012
release_month                                          9
release_day                                           11
Name: 9, dtype: object
```

First column is not useful. So remove it

In [27]:
```
reviews.drop(0)
```

Out[27]:

	Unnamed: 0	score_phrase	title	url	platform	score	genre	editors_choice	release_year	release_month	release_day
1	1	Amazing	LittleBigPlanet PS Vita -- Marvel Super Hero E...	/games/littlebigplanet-ps-vita-marvel-super-he...	PlayStation Vita	9.0	Platformer	Y	2012	9	12
2	2	Great	Splice: Tree of Life	/games/splice/ipad-141070	iPad	8.5	Puzzle	N	2012	9	12
3	3	Great	NHL 13	/games/nhl-13/xbox-360-128182	Xbox 360	8.5	Sports	N	2012	9	11
4	4	Great	NHL 13	/games/nhl-13/ps3-128181	PlayStation 3	8.5	Sports	N	2012	9	11
5	5	Good	Total War Battles: Shogun	/games/total-war-battles-shogun/mac-142565	Macintosh	7.0	Strategy	N	2012	9	11
...	...	...	...	...	...	...	...	...	...	...	...
18620	18620	Good	Tokyo Mirage Sessions #FE	/games/fire-emblem-x-shin-megami-tensei/wii-u-...	Wii U	7.6	RPG	N	2016	6	29
18621	18621	Amazing	LEGO Star Wars: The Force Awakens	/games/lego-star-wars-the-force-awakens/ps4-20...	PlayStation 4	9.0	Action, Adventure	Y	2016	6	29
18622	18622	Mediocre	Star Ocean: Integrity and Faithlessness	/games/star-ocean-5/ps4-20035681	PlayStation 4	5.8	RPG	N	2016	6	28
18623	18623	Masterpiece	Inside	/games/inside-playdead/xbox-one-121435	Xbox One	10.0	Adventure	Y	2016	6	28
18624	18624	Masterpiece	Inside	/games/inside-playdead/pc-20055740	PC	10.0	Adventure	Y	2016	6	28

18624 rows × 11 columns

Selection using row and columns lables

In [28]:
```
df_stud
```

Out[28]:

	rollno	name	class	address
0	DS01	Rex	1msc	Delhi
1	DS02	peter	2msc	Bangalore
2	CS01	ann	3bsc	Chennai

Print all names using loc

In [29]:
```
df_stud.loc[:,'name']
```

Out[29]:
```
0      Rex
1    peter
2      ann
Name: name, dtype: object
```

Let us come back to our reviews. Display the first five rows of reviews using the loc method

In [30]:
```
reviews.loc[:4,:]
```

Out[30]:

	Unnamed: 0	score_phrase	title	url	platform	score	genre	editors_choice	release_year	release_month	release_day
0	0	Amazing	LittleBigPlanet PS Vita	/games/littlebigplanet-vita/vita-98907	PlayStation Vita	9.0	Platformer	Y	2012	9	12
1	1	Amazing	LittleBigPlanet PS Vita -- Marvel Super Hero E...	/games/littlebigplanet-ps-vita-marvel-super-he...	PlayStation Vita	9.0	Platformer	Y	2012	9	12
2	2	Great	Splice: Tree of Life	/games/splice/ipad-141070	iPad	8.5	Puzzle	N	2012	9	12
3	3	Great	NHL 13	/games/nhl-13/xbox-360-128182	Xbox 360	8.5	Sports	N	2012	9	11
4	4	Great	NHL 13	/games/nhl-13/ps3-128181	PlayStation 3	8.5	Sports	N	2012	9	11

Select score_phrase column using loc and print head

In [31]:
```
reviews.loc[:4,'score_phrase']
```

Out[31]:
```
0    Amazing
1    Amazing
2      Great
3      Great
4      Great
Name: score_phrase, dtype: object
```

Print top 10 values of column label "score_phrase"

In [32]:
```
reviews.loc[:9,'score_phrase']
```

Out[32]:
```
0    Amazing
1    Amazing
2      Great
3      Great
4      Great
5       Good
6      Awful
7    Amazing
8      Awful
9       Good
Name: score_phrase, dtype: object
```

Select from reviews of rows from 5 to 15

In [33]:
```
some_reviews=reviews.loc[5:15,:]
```

In [34]:
```
some_reviews.head()
```

Out[34]:

	Unnamed: 0	score_phrase	title	url	platform	score	genre	editors_choice	release_year	release_month	release_day
5	5	Good	Total War Battles: Shogun	/games/total-war-battles-shogun/mac-142565	Macintosh	7.0	Strategy	N	2012	9	11
6	6	Awful	Double Dragon: Neon	/games/double-dragon-neon/xbox-360-131320	Xbox 360	3.0	Fighting	N	2012	9	11
7	7	Amazing	Guild Wars 2	/games/guild-wars-2/pc-896298	PC	9.0	RPG	Y	2012	9	11
8	8	Awful	Double Dragon: Neon	/games/double-dragon-neon/ps3-131321	PlayStation 3	3.0	Fighting	N	2012	9	11
9	9	Good	Total War Battles: Shogun	/games/total-war-battles-shogun/pc-142564	PC	7.0	Strategy	N	2012	9	11

Select score of first 3 rows some_reviews

In [35]:
```
some_reviews.loc[:,'score'].head(3)
```

Out[35]:
```
5    7.0
6    3.0
7    9.0
Name: score, dtype: float64
```

Select "score", "genre", and "release_year" columns from reviews dataframe and print head

In [36]:
```
reviews.loc[:,['score','genre','release_year']].head()
```

Out[36]:

	score	genre	release_year
0	9.0	Platformer	2012
1	9.0	Platformer	2012
2	8.5	Puzzle	2012
3	8.5	Sports	2012
4	8.5	Sports	2012

What is the datatype of "score" column?

In [37]:

```
X=reviews.loc[:,'score']
type(X)
```

Out[37]:

```
pandas.core.series.Series
```

Aggregate Columns

Find average value of score column in reviews dataframe

In [38]:

```
reviews.score.mean()
```

Out[38]:

```
6.950459060402666
```

In [39]:

```
reviews.mean()
```

```
C:\Users\user\AppData\Local\Temp\ipykernel_13364\1149272715.py:1: FutureWarning: Dropping of nuisance columns in DataFrame reductions (with 'n
umeric_only=None') is deprecated; in a future version this will raise TypeError.  Select only valid columns before calling the reduction.
  reviews.mean()
```

Out[39]:

```
Unnamed: 0       9312.000000
score               6.950459
release_year     2006.515329
release_month       7.138470
release_day        15.603866
dtype: float64
```

Find average value for each numeric column

In [40]:

```
reviews.mean()
```

```
C:\Users\user\AppData\Local\Temp\ipykernel_13364\1149272715.py:1: FutureWarning: Dropping of nuisance columns in DataFrame reductions (with 'n
umeric_only=None') is deprecated; in a future version this will raise TypeError.  Select only valid columns before calling the reduction.
  reviews.mean()
```

Out[40]:

```
Unnamed: 0       9312.000000
score               6.950459
release_year     2006.515329
release_month       7.138470
release_day        15.603866
dtype: float64
```

Find average value for each row containing numeric values and print head

In [41]:

```
reviews.mean(axis=1).head()
```

```
C:\Users\user\AppData\Local\Temp\ipykernel_13364\2558754022.py:1: FutureWarning: Dropping of nuisance columns in DataFrame reductions (with 'n
umeric_only=None') is deprecated; in a future version this will raise TypeError.  Select only valid columns before calling the reduction.
  reviews.mean(axis=1).head()
```

Out[41]:

```
0    408.4
1    408.6
2    408.7
3    408.7
4    408.9
dtype: float64
```

Find lowest, highest, median, standard deviation of score column of reviews dataframe

show median of "score" column of reviews dataframe

In [42]:

```
reviews.score.median()
```

Out[42]:

```
7.3
```

show minimum of "score" column of reviews dataframe

In [43]:

```
a=reviews.score
min(a)
```

Out[43]:

```
0.5
```

show maximum of "score" column of reviews dataframe

```
In [44]: max(a)
```

```
Out[44]: 10.0
```

show standard deviation of "score" column of reviews dataframe

```
In [45]: reviews['score'].std()
```

```
Out[45]: 1.7117358608045874
```

How many non-null values in "score" column of reviews dataframe?

```
In [46]: reviews['score'].notnull().sum()
```

```
Out[46]: 18625
```

Show the summary of reviews dataframe

```
In [47]: reviews.describe()
```

Out[47]:

	Unnamed: 0	score	release_year	release_month	release_day
count	18625.000000	18625.000000	18625.000000	18625.00000	18625.000000
mean	9312.000000	6.950459	2006.515329	7.13847	15.603866
std	5376.718717	1.711736	4.587529	3.47671	8.690128
min	0.000000	0.500000	1970.000000	1.00000	1.000000
25%	4656.000000	6.000000	2003.000000	4.00000	8.000000
50%	9312.000000	7.300000	2007.000000	8.00000	16.000000
75%	13968.000000	8.200000	2010.000000	10.00000	23.000000
max	18624.000000	10.000000	2016.000000	12.00000	31.000000

Check if review score has any correlation with other columns of reviews

```
In [48]: reviews.corr()
```

Out[48]:

	Unnamed: 0	score	release_year	release_month	release_day
Unnamed: 0	1.000000	0.035579	0.893394	-0.096676	0.010068
score	0.035579	1.000000	0.062716	0.007632	0.020079
release_year	0.893394	0.062716	1.000000	-0.115515	0.016867
release_month	-0.096676	0.007632	-0.115515	1.000000	-0.067964
release_day	0.010068	0.020079	0.016867	-0.067964	1.000000

Math Operations on DF columns

Divide the values of "score" column in reviews dataframe by 2. There will be too many values, so just print head

```
In [49]: (reviews.score/2).head()
```

```
Out[49]: 0    4.50
         1    4.50
         2    4.25
         3    4.25
         4    4.25
         Name: score, dtype: float64
```

Boolean Indexing in Pandas

Select all video games whose review score > 7, call it score_filter

```
In [50]: score_filter=(reviews.score>7)
```

Print head of score_filter

```
In [51]: score_filter.head()
```

```
Out[51]: 0    True
         1    True
         2    True
         3    True
         4    True
         Name: score, dtype: bool
```

Select all rows for score_filter column and print its head

```
In [52]: filtered_reviews=reviews[reviews.score>7]
```

```
In [53]: filtered_reviews.head()
```

Out[53]:

	Unnamed: 0	score_phrase	title	url	platform	score	genre	editors_choice	release_year	release_month	release_day
0	0	Amazing	LittleBigPlanet PS Vita	/games/littlebigplanet-vita/vita-98907	PlayStation Vita	9.0	Platformer	Y	2012	9	12
1	1	Amazing	LittleBigPlanet PS Vita -- Marvel Super Hero E...	/games/littlebigplanet-ps-vita-marvel-super-he...	PlayStation Vita	9.0	Platformer	Y	2012	9	12
2	2	Great	Splice: Tree of Life	/games/splice/ipad-141070	iPad	8.5	Puzzle	N	2012	9	12
3	3	Great	NHL 13	/games/nhl-13/xbox-360-128182	Xbox 360	8.5	Sports	N	2012	9	11
4	4	Great	NHL 13	/games/nhl-13/ps3-128181	PlayStation 3	8.5	Sports	N	2012	9	11

Show the size of filtered_reviews

```
In [54]: filtered_reviews.shape
```

```
Out[54]: (9800, 11)
```

Show top 10 "title" from filtered_reviews

```
In [55]: (filtered_reviews.title).head(10)
```

```
Out[55]: 0                             LittleBigPlanet PS Vita
         1     LittleBigPlanet PS Vita -- Marvel Super Hero E...
         2                                Splice: Tree of Life
         3                                              NHL 13
         4                                              NHL 13
         7                                        Guild Wars 2
         10                            Tekken Tag Tournament 2
         11                            Tekken Tag Tournament 2
         13                                  Mark of the Ninja
         14                                  Mark of the Ninja
         Name: title, dtype: object
```

Find games released for the Xbox One platform that have a score of more than 7

Find create a filter, called xbox-one_filter fot the conitions.

```
In [56]: xbox_one_filter = (reviews["score"] > 7) & (reviews["platform"] == "Xbox One")
```

Select those rows from reviews of xbox_one_filter and print head.

In [57]:

```
filtered_reviews2 = reviews[xbox_one_filter]
filtered_reviews2.head()
```

Out[57]:

	Unnamed: 0	score_phrase	title	url	platform	score	genre	editors_choice	release_year	release_month	release_day
17137	17137	Amazing	Gone Home	/games/gone-home/xbox-one-20014361	Xbox One	9.5	Simulation	Y	2013	8	15
17197	17197	Amazing	Rayman Legends	/games/rayman-legends/xbox-one-20008449	Xbox One	9.5	Platformer	Y	2013	8	26
17295	17295	Amazing	LEGO Marvel Super Heroes	/games/lego-marvel-super-heroes/xbox-one-20000826	Xbox One	9.0	Action	Y	2013	10	22
17313	17313	Great	Dead Rising 3	/games/dead-rising-3/xbox-one-124306	Xbox One	8.3	Action	N	2013	11	18
17317	17317	Great	Killer Instinct	/games/killer-instinct-2013/xbox-one-20000538	Xbox One	8.4	Fighting	N	2013	11	18

What is the size of filtered_reviews 2.

In [58]:

```
filtered_reviews2.shape
```

Out[58]:

```
(140, 11)
```

Select all video games which are "Action".

In [59]:

```
action_reviews = reviews[reviews.genre == 'Action']
```

In [60]:

```
action_reviews.head()
```

Out[60]:

	Unnamed: 0	score_phrase	title	url	platform	score	genre	editors_choice	release_year	release_month	release_day
17	17	Great	Avengers Initiative	/games/avengers-initiative/iphone-141579	iPhone	8.0	Action	N	2012	9	5
34	34	Good	War of the Roses	/games/war-of-the-roses-140577/pc-115849	PC	7.3	Action	N	2012	10	3
45	45	Amazing	Bad Piggies	/games/bad-piggies/iphone-141455	iPhone	9.2	Action	Y	2012	10	1
49	49	Okay	Demon's Score	/games/demons-score/iphone-118050	iPhone	6.9	Action	N	2012	9	27
69	69	Great	Hotline Miami	/games/hotline-miami/pc-139657	PC	8.8	Action	Y	2012	10	26

In [61]:

```
action_reviews = reviews[reviews.genre == 'Action']

action_reviews.head()
```

Out[61]:

	Unnamed: 0	score_phrase	title	url	platform	score	genre	editors_choice	release_year	release_month	release_day
17	17	Great	Avengers Initiative	/games/avengers-initiative/iphone-141579	iPhone	8.0	Action	N	2012	9	5
34	34	Good	War of the Roses	/games/war-of-the-roses-140577/pc-115849	PC	7.3	Action	N	2012	10	3
45	45	Amazing	Bad Piggies	/games/bad-piggies/iphone-141455	iPhone	9.2	Action	Y	2012	10	1
49	49	Okay	Demon's Score	/games/demons-score/iphone-118050	iPhone	6.9	Action	N	2012	9	27
69	69	Great	Hotline Miami	/games/hotline-miami/pc-139657	PC	8.8	Action	Y	2012	10	26

Action_reviews.shape

Plot review ratings of two lay stations and compare which one has more ratings?

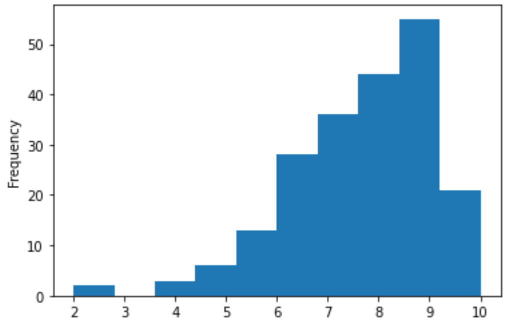
Plot Histogram for the frequencies of different score ranges of xbox_one platform.

In [62]:

```
import matplotlib.pyplot as plt
```

```
In [63]: reviews[reviews["platform"] == "Xbox One"]["score"].plot(kind="hist")
```

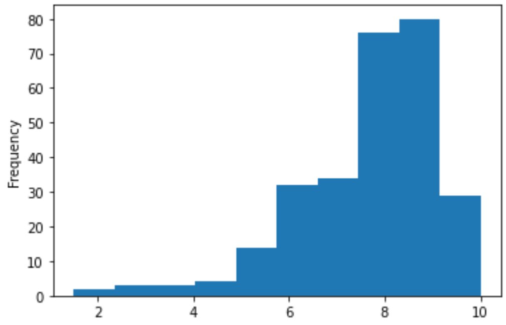
```
Out[63]: <AxesSubplot:ylabel='Frequency'>
```



Plot Histogram for frequencies of the score of play station 4 platform.

```
In [64]: reviews[reviews["platform"] == "PlayStation 4"]["score"].plot(kind="hist")
```

```
Out[64]: <AxesSubplot:ylabel='Frequency'>
```


Frequency