DATA SCIENCE AND BUSINESS ANALYTICS (GRIP Oct'22)

Task-1: Prediction using supervised ML

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Problem Statement: What will be predicted score if a student studies for 9.25hrs/day?

In [ ]:
```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sn
from sklearn.model_selection import train_test_split
from sklearn.metrics import mean_squared_error
from sklearn.metrics import r2_score
```

In [2]:
```
# Importing Dataset and visualizing Data
df = pd.read_csv('https://raw.githubusercontent.com/AdiPersonalWork
print('Data has been successfully imported')
df
```

```
Data has been successfully imported
```

Out[2]:

	Hours	Scores
0	2.5	21
1	5.1	47
2	3.2	27
3	8.5	75
4	3.5	30
5	1.5	20
6	9.2	88
7	5.5	60
8	8.3	81
9	2.7	25
10	7.7	85
11	5.9	62
12	4.5	41
13	3.3	42
14	1.1	17
15	8.9	95
16	2.5	30
17	1.9	24
18	6.1	67
19	7.4	69
20	2.7	30
21	4.8	54
22	3.8	35
23	6.9	76
24	7.8	86

Here, we have data for 25 students-study hours and score achieved. We will plot the data so that we can roughly find relationship between study hours and scores

In [3]:
```
df.describe()
```

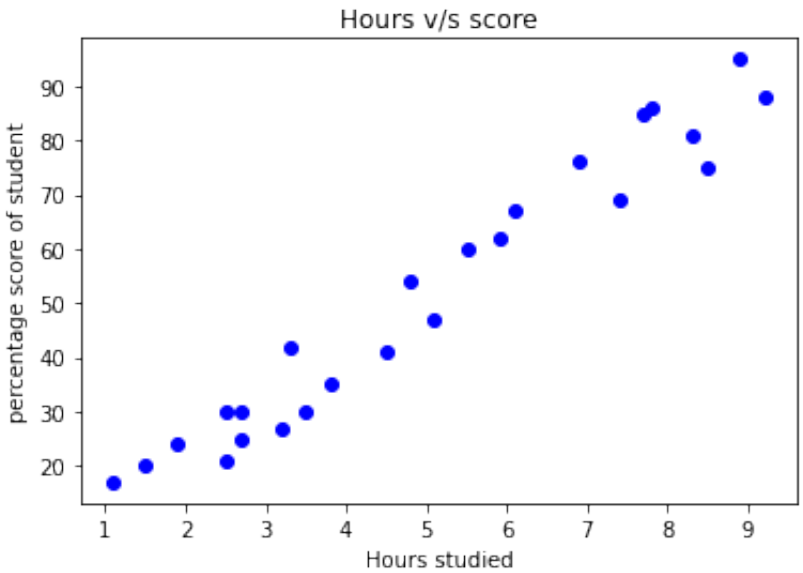
Out[3]:

	Hours	Scores
count	25.000000	25.000000
mean	5.012000	51.480000
std	2.525094	25.286887
min	1.100000	17.000000
25%	2.700000	30.000000
50%	4.800000	47.000000
75%	7.400000	75.000000
max	9.200000	95.000000

Fig1- Scatter plot between number of hours studied and the percentage scored

In [4]:
```
x= df['Hours']
y= df['Scores']
plt.xlabel("Hours studied")
plt.ylabel("percentage score of student")
plt.title("Hours v/s score")
plt.scatter(x,y, color='blue')
```

Out[4]:
```
<matplotlib.collections.PathCollection at 0x7f99eba9f3a0>
```

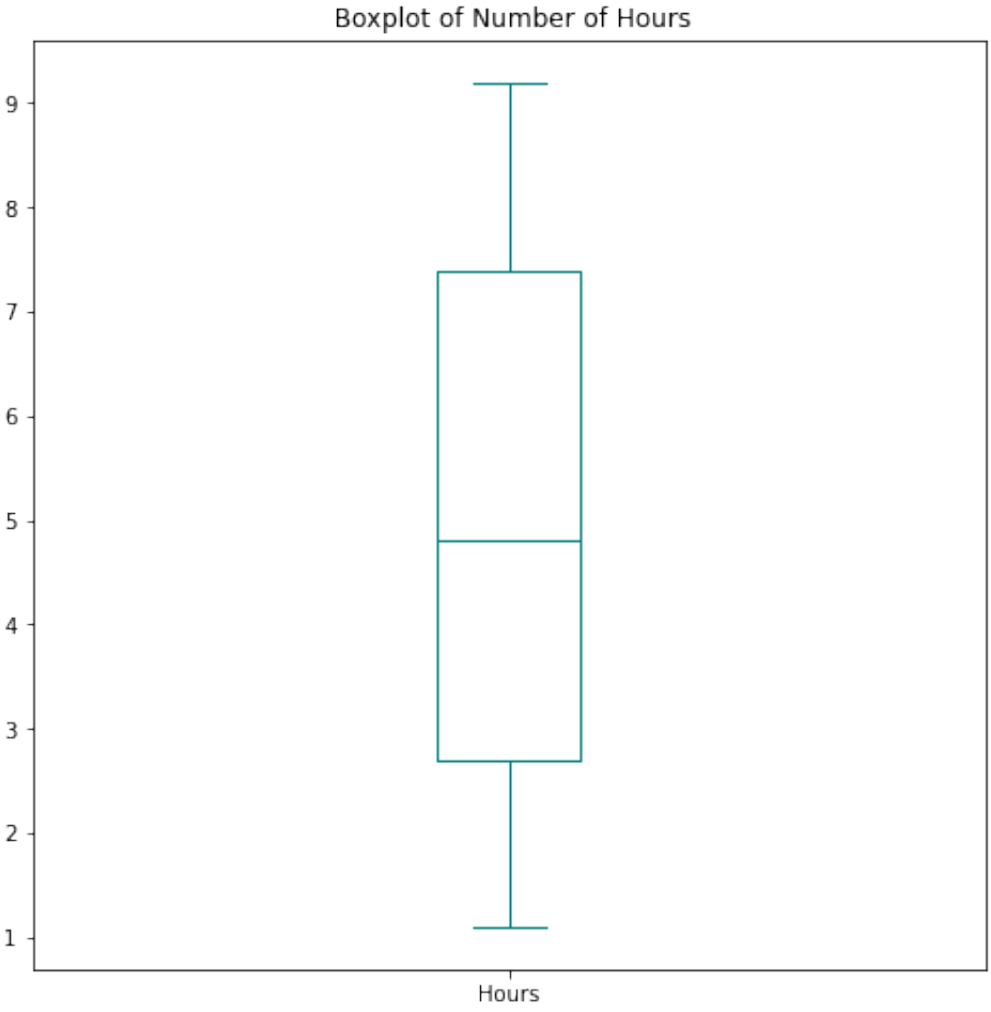


We can Observe that there is a positive linear relationship between study hours and scores

Fig2- Box Plot for the number of hour studied

In [5]:
```
df.Hours.plot.box(color="teal", figsize=(8,8))
plt.title(" Boxplot of Number of Hours")
```

Out[5]:
```
Text(0.5, 1.0, ' Boxplot of Number of Hours')
```

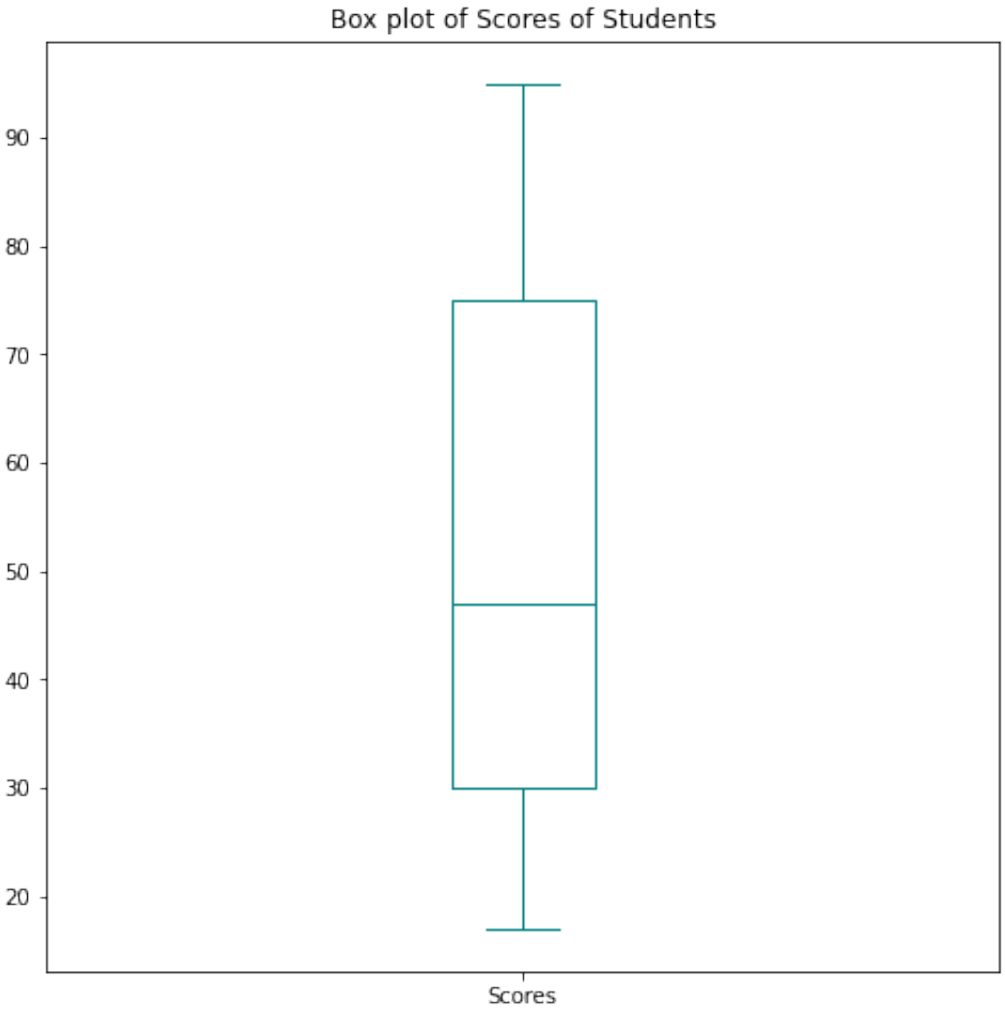


The plot shows that median hours of study by a student is almost 5 hours per day. It also shows that there is no outliers and that it is not normally distributed since median is not equal to mean

Fig3- Boxplot for scores

In [6]:
```
df.Scores.plot.box(color="teal", figsize=(8,8))
plt.title("Box plot of Scores of Students")
```

Out[6]: Text(0.5, 1.0, 'Box plot of Scores of Students')

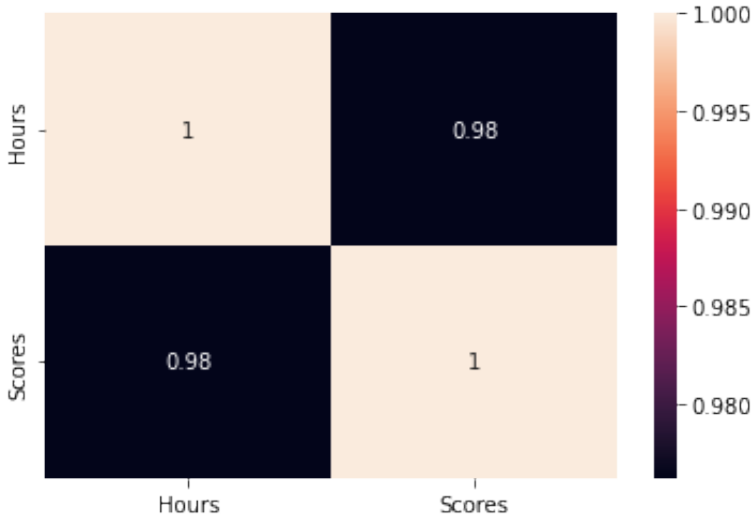


The plot shows that the percentage of score by a student is around 48%. It also shows that there is no outliers and that it is not normally distributed since median is not equal to mean.

Fig4- Correlation heat map of number of hours studied and the percentage scored

In [7]:
```
corrmatrix= df.corr()
sn.heatmap(corrmatrix,annot=True)
plt.show
```

Out[7]: <function matplotlib.pyplot.show(close=None, block=None)>



The correlation coefficient obtained is 0.98 which implies that the hours of study and the percentage scored by a student is highly positively correlated.

Data Preparation

The next step is to divide the data into attributes(inputs) and labels(outputs)

In [8]:
```
x=df.iloc[:,:-1].values
y=df.iloc[:,1].values
```

Now we have our attributes and and labels,the next step is to split the data into training and tests sets using train_test_split()method

Splitting data into training and testing sets

In [9]:
```
x_train,x_test,y_train,y_test = train_test_split(x,y, test_size=0.2
```

In [10]:
```
print("Dimension of training set of scores=",x_train.ndim)
print("Dimension of training set of hours=", y_train.ndim)
```

```
Dimension of training set of scores= 2
Dimension of training set of hours= 1
```

Training the algorithm

```
#from sklearn.linear_model import LinearRegression
model=LinearRegression()
model.fit(x_train,y_train)
print('The training is Completed')
```

Making prediction on training set and checking RMSE

In [12]:
```
from sklearn.metrics import r2_score
y_pred =model.predict(x_test)
r2_score(y_test,y_pred)
```

Out[12]:
```
0.9601769396057881
```

In [16]:
```
mean_squared_error(y_test,y_pred,squared=False)
```

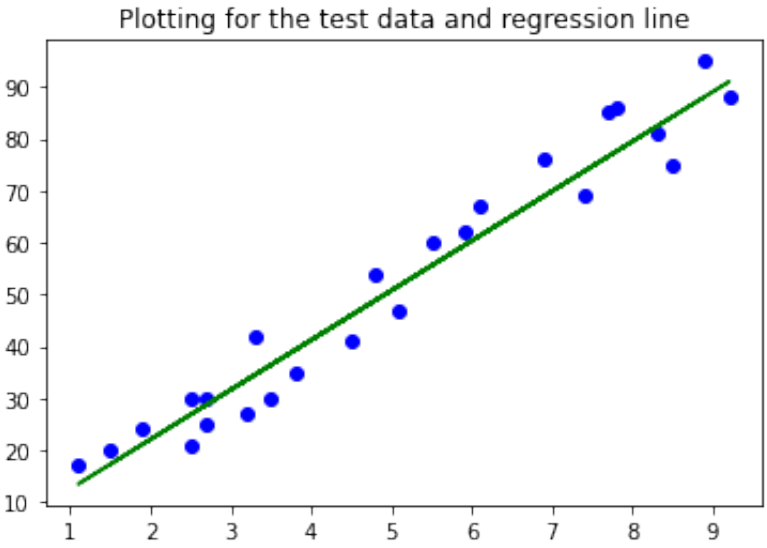
Out[16]:
```
5.523661462438607
```

Model has an accuracy score of 0.9601 i.e, it's 96% good fit and it's RMSE is 5.52%

Fig5- Plotting the regression line and the test data

In [14]:
```
line=model.coef_*x + model.intercept_
plt.scatter(x,y,color="blue")
plt.plot(x,line,color="green")
plt.title("Plotting for the test data and regression line")
```

Out[14]:
```
Text(0.5, 1.0, 'Plotting for the test data and regression line')
```



Prediction

In [15]:
```
# To predict the score of a student if he/she studies 9.25 hours pe
Hours = 9.25
model.predict([[Hours]])
```

Out[15]:
```
array([91.49342293])
```

A student scores 91.49% if she/he studies for 9.25 hours per day

In [ ]:

In [ ]: