Name: Ninan P Oommen

Task 1: To predict the percentage of a student based on the number of study hours using supervised machine learning.

In [1]:
```
# Loading the required packages

import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sn
```

In [2]:
```
# Importing the dataset

data = pd.read_excel("Data (1).xlsx")
data
```

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

	Hours	Scores
23	6.9	76
24	7.8	86

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

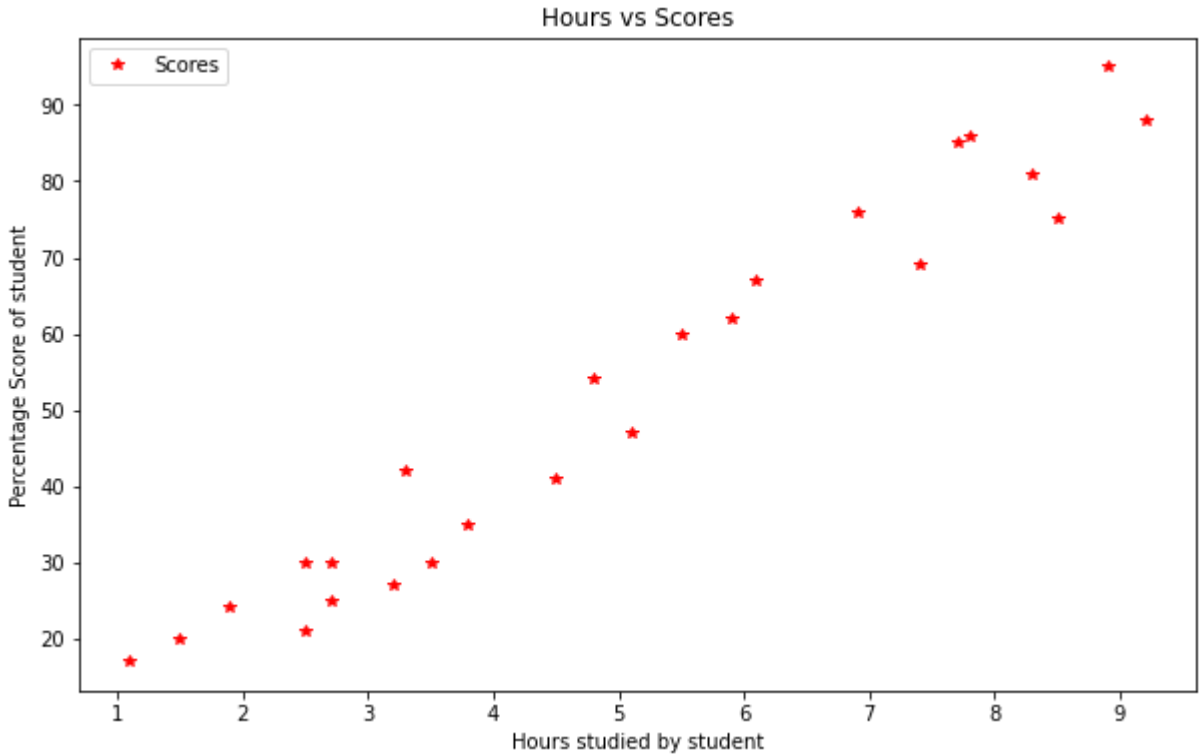
Out[3]:

	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 Percentage Score

In [4]:
```
plt.rcParams["figure.figsize"] = (10,6)
data.plot(x='Hours', y='Scores', style='*',color='red')
plt.title('Hours vs Scores')
plt.xlabel('Hours studied by student')
plt.ylabel('Percentage Score of student')
plt.show
```

Out[4]:
```
<function matplotlib.pyplot.show(close=None, block=None)>
```

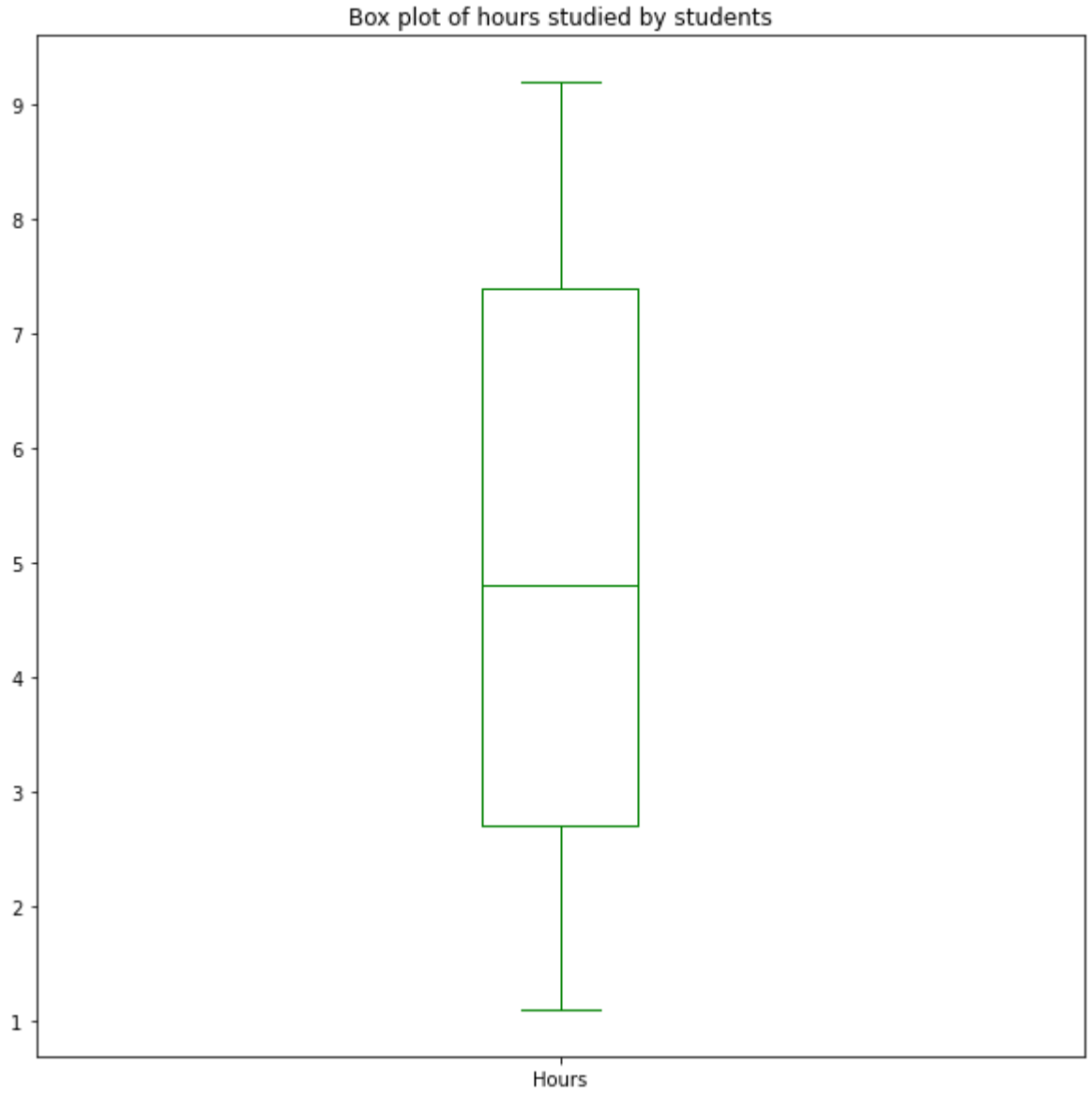


Interpretation: This scatter plot clearly demonstrates that there is a positive correlation between the percentage of a student and hours studied by the students.

Fig 2. Box Plot for the number of hours studied

In [5]:
```
data.Hours.plot.box(color="green",figsize=(10,10))
plt.title("Box plot of hours studied by students")
```

Out[5]:
```
Text(0.5, 1.0, 'Box plot of hours studied by students')
```

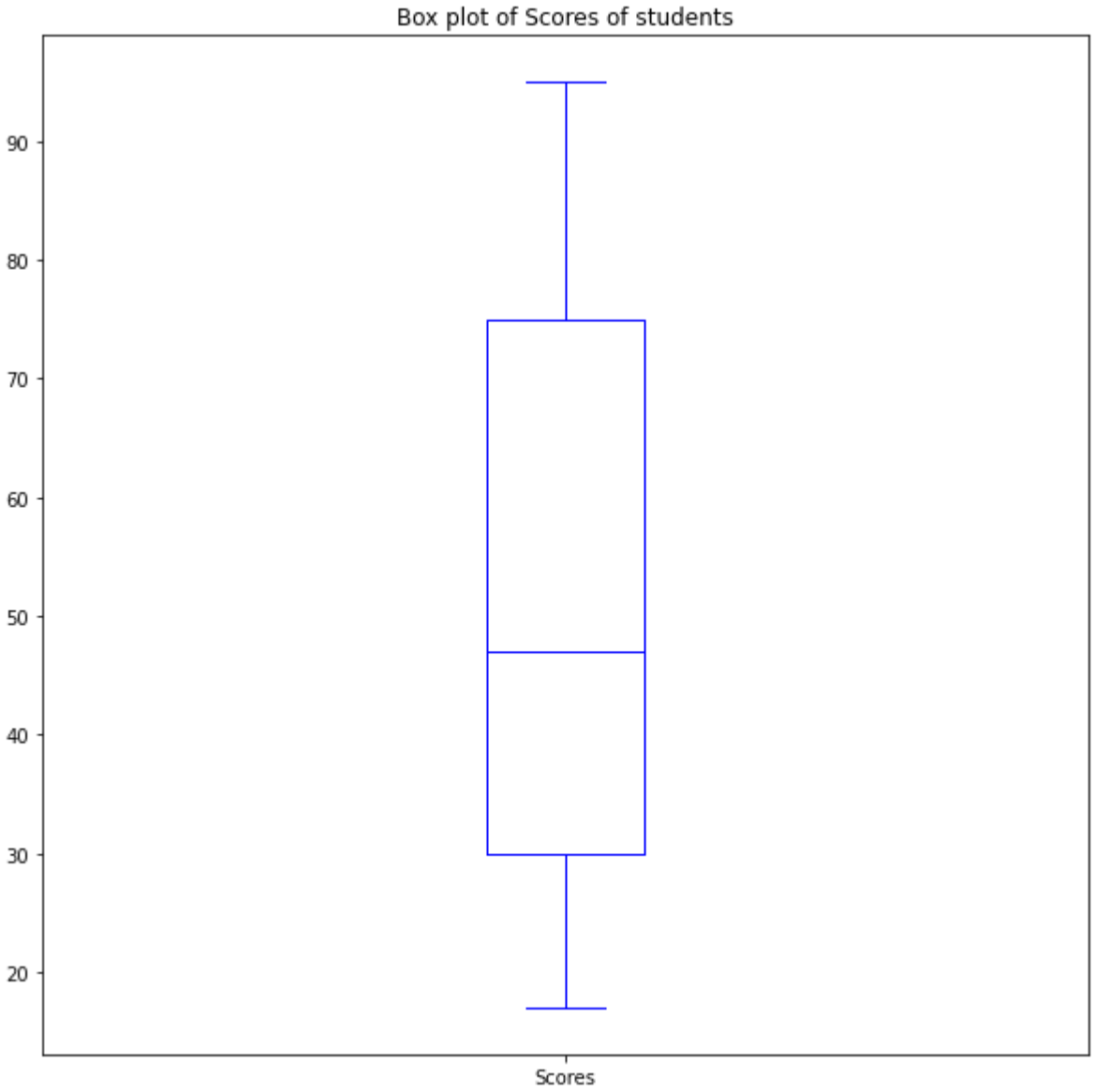


Interpretation: The above plot shows that the median hours of study per day by student is almost 5 hours. It also shows that there is no outliers and that it is not normally distributed since median is not equal to mean.

Fig 3. Box plot for Scores of students

In [6]:
```
data.Scores.plot.box(color="blue",figsize=(10,10))
plt.title("Box plot of Scores of students")
```

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

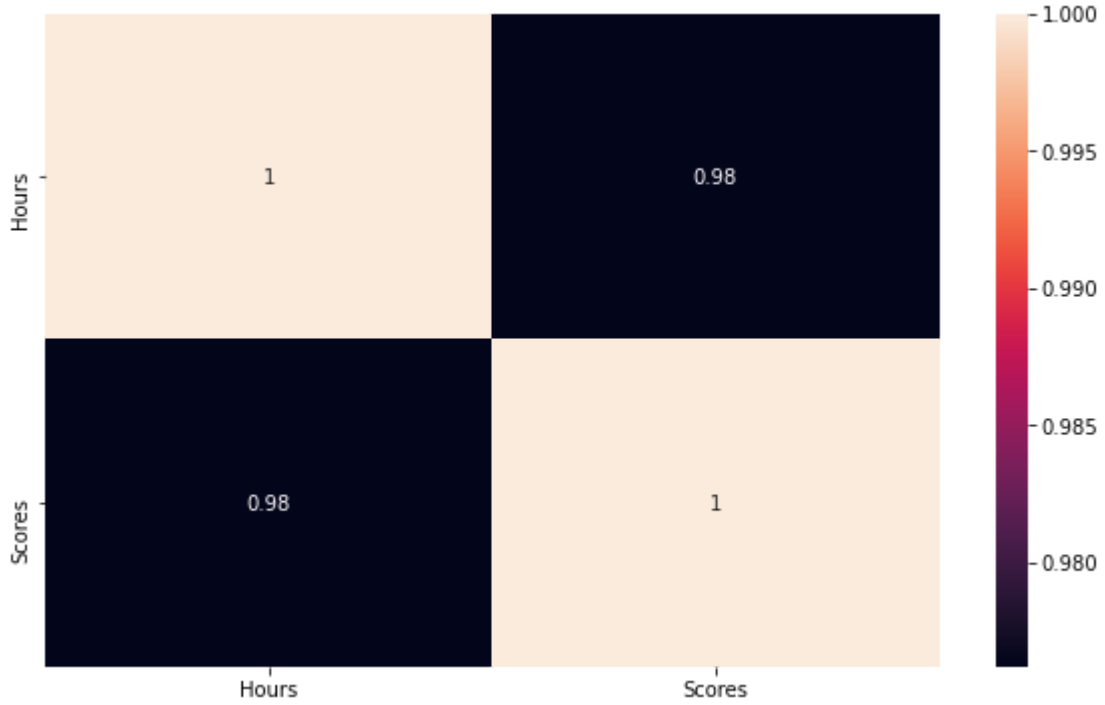


Interpretation: The above plot shows that the percentage of score by a student is around 48%. It also shows that there is no outliers and that it is not normally distributed since median is not equal to mean.

Fig 4. Correlation heat map of number of hours studied and the percentage score

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

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



Interpretation: 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 = data.iloc[:, :-1].values
y = data.iloc[:, 1].values
```

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

Splitting data into training and testing sets

In [9]:
```
from sklearn.model_selection import train_test_split
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, random_state=0)
```

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

In [11]:
```
from sklearn.linear_model import LinearRegression
model = LinearRegression()
model.fit(X_train, y_train)
print("The training is completed")
```

```
The training is completed
```

Making prediction on training set and checking the RMSE

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

Out[12]:
```
0.9454906892105355
```

In [13]:
```
from sklearn.metrics import mean_squared_error
mean_squared_error(y_test,y_pred,squared=False)
```

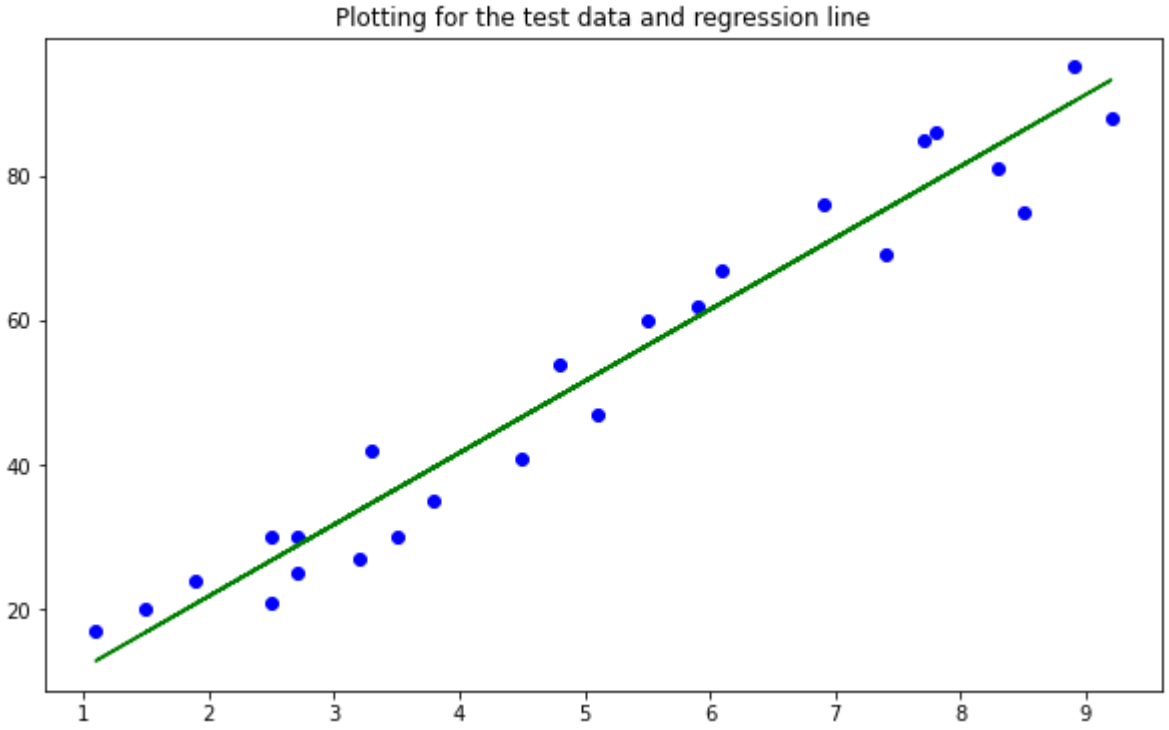
Out[13]:
```
4.647447612100367
```

Interpretation: The model has an accuracy score of 0.9454. i.e, it is 95% good fit with its RMSE of 4.64%

Fig 5. 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 per day

hours = 9.25
model.predict([[hours]])
```

Out[15]:
```
array([93.69173249])
```

Interpretation: A student scores 93.69% if they study for 9.25 hours per day.

In [ ]: