THE SPARKS FOUNDATION

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TASK 1: Prediction using Supervised Learning

IMPORTING THE NECESSARY LIBRARIES:

In [25]:
```
import pandas as pd
import numpy as np
import seaborn as sns
import matplotlib.pyplot as plt
from sklearn.linear_model import LinearRegression
from sklearn.model_selection import train_test_split
from sklearn.metrics import mean_absolute_error
```

READING THE DATASET

In [14]:
```
dataset = pd.read_csv("https://raw.githubusercontent.com/AdiPersonalWorks/Random/master/student_scores%20-%20student_scores.csv")
dataset
```

Out[14]:

	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

CALCULATING THE CONSTRAINTS

In [15]:
```
dataset.describe()
```

Out[15]:

	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

DISPLAYING ALL THE COLUMNS AND THEIR DATA TYPES

In [16]:
```
dataset.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 25 entries, 0 to 24
Data columns (total 2 columns):
 #   Column  Non-Null Count  Dtype  
---  ------  --------------  -----  
 0   Hours   25 non-null    float64
 1   Scores  25 non-null    int64  
dtypes: float64(1), int64(1)
memory usage: 528.0 bytes
```

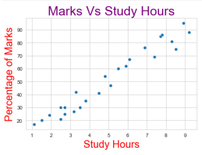
CHECKING IF THERE EXISTS ANY NULL VALUE

In [17]:
```
dataset.isnull == True
```

Out[17]:
```
False
```

VISUALIZING THE DATA

In [28]:
```
sns.set_style('whitegrid')
sns.scatterplot(y= dataset['Scores'], x= dataset['Hours'])
plt.title('Marks Vs Study Hours',size=25,color="Purple")
plt.ylabel('Percentage of Marks', size=20,color="Red")
plt.xlabel('Study Hours', size=20,color="Red")
plt.show()
```



WE CAN SEE THAT THERE IS A CORRELATION BETWEEN "PERCENTAGE OF MARKS" AND "STUDY HOURS"

LET'S PLOT A REGRESSION LINE TO THE ABOVE GRAPH

In [29]:
```
sns.regplot(x= dataset['Hours'], y= dataset['Scores'])
plt.title('Regression Plot',size=25,color="Purple")
plt.ylabel('Percentage of Marks', size=15,color="Red")
plt.xlabel('Study Hours', size=15,color="Red")
plt.show()
print(dataset.corr())
```


```
            Hours     Scores
Hours    1.000000  0.976191
Scores   0.976191  1.000000
```

FROM THE ABOVE GRAPH WE HAVE VERIFIED THAT THE VARIABLES ARE POSITIVELY CORRELATED.

MODEL TRAINING

FIRSTLY, WE WILL DEFINE VARIABLES A & B FROM THE DATASET AND THEN SPLIT THE DATASET INTO TWO PARTS

In [30]:
```
# Defining variables A and B from the Dataset
A = dataset.iloc[:, :-1].values
B = dataset.iloc[:, 1].values

# Splitting the Dataset into two parts
train_A, val_A, train_B, val_B = train_test_split(A, B, random_state = 0)
```

SECONDLY, WE WILL BE DOING DATA FITTING IN THE MODEL

In [31]:
```
var_regression = LinearRegression()
var_regression.fit(train_A, train_B)
print("MODEL IS TRAINED SUCCESSFULLY!")
```

```
MODEL IS TRAINED SUCCESSFULLY!
```

NOW WE WILL MOVE ON TO PREDICTION OF THE PERCENTAGE OF THE MARKS.

In [32]:
```
var_prediction_B = var_regression.predict(val_A)
Prediction = pd.DataFrame({'Study Hours': [i[0] for i in val_A], 'Predicted Marks': [j for j in var_prediction_B]})
Prediction
```

Out[32]:

	Study Hours	Predicted Marks
0	1.5	16.844722
1	3.2	33.745575
2	7.4	75.500624
3	2.5	26.786400
4	5.9	60.588106
5	3.8	39.710582
6	1.9	20.821393

NOW, COMPARING THE PREDICTED MARKS WITH THE ACTUAL MARKS IN THE DATASET.

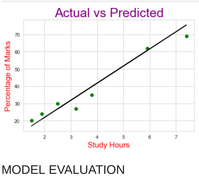
In [33]:
```
comparison_of_scores = pd.DataFrame({'Actual Marks': val_B, 'Predicted Marks': var_prediction_B})
comparison_of_scores
```

Out[33]:

	Actual Marks	Predicted Marks
0	20	16.844722
1	27	33.745575
2	69	75.500624
3	30	26.786400
4	62	60.588106
5	35	39.710582
6	24	20.821393

HERE, WE COMPARE THE PREDICTED MARKS WITH THE ACTUAL MARKS USING THE DATA VISUALIZATION

In [40]:
```
plt.scatter(x=val_A, y=val_B, color='Green')
plt.plot(val_A, var_prediction_B, color='Black')
plt.title('Actual vs Predicted', size=25,color="Purple")
plt.ylabel('Percentage of Marks', size=15,color="Red")
plt.xlabel('Study Hours', size=15,color="Red")
plt.show()
```



MODEL EVALUATION

LET'S CALCULATE THE ACCURACY OF THE MODEL.

In [41]:
```
print('Mean absolute error: ',mean_absolute_error(val_B,var_prediction_B))
```

```
Mean absolute error:  4.130879918502486
```

As the value of the Mean Absolute Error is very small, it indicates that there are very less possibilities of errors throughout the model.

NOW MOVING ON TOWARDS OUR QUESTION, LET'S FIND THE ANSWER.

WHAT WILL BE THE PREDICTED SCORE IF A STUDENT STUDIES FOR 9.25 HRS PER DAY?

In [44]:
```
hours = [9.25]
answer_to_the_question = var_regression.predict([hours])
print("Predicted Score : {}".format(round(answer_to_the_question[0],2)))
```

```
Predicted Score : 93.89
```

*Accorcing to regression model, if a student studies for 9.25 hours per day then the student is likely to score **93.89 marks**.*