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Simple Linear Regression

In [116]:
```
import pandas as pd     #For Data Manipulation
import numpy as np      #For Working with n-dimensional arrays

import matplotlib.pyplot as plt      #For visualization of data
import seaborn as sns                #For visulatization purpose


from sklearn.model_selection import train_test_split as ts  #For splitting our da
from sklearn.linear_model import LinearRegression   #algorithm for making model
from sklearn.metrics import mean_absolute_error
from sklearn.metrics import r2_score
```

In [3]:
```
df =pd.read_csv("https://raw.githubusercontent.com/AdiPersonalWorks/Random/master
```

In [5]:
```
#For inspecting first five rows of data
df.head()
```

Out[5]:

	Hours	Scores
0	2.5	21
1	5.1	47
2	3.2	27
3	8.5	75
4	3.5	30

In [6]:
```
#For Inspecting rows selected at random
df.sample(10)
```

Out[6]:

	Hours	Scores
21	4.8	54
2	3.2	27
22	3.8	35
13	3.3	42
20	2.7	30
1	5.1	47
18	6.1	67
12	4.5	41
3	8.5	75
24	7.8	86

In [9]:
```
#Checking Shape of our data
print("No. of rows are %i"%df.shape[0])
print("No of columns are %i "%df.shape[1])
```

```
No. of rows are 25
No of columns are 2
```

In [10]:
```
#Checking data types of columns
df.dtypes
```

Out[10]:
```
Hours     float64
Scores      int64
dtype: object
```

In [11]:
```
#Checking Null values in our dataset
df.isnull().sum()
```

Out[11]:
```
Hours     0
Scores    0
dtype: int64
```

In [17]:
```
#Checking for duplicate rows in our data
df.duplicated().sum()
```

Out[17]:
```
0
```

In [19]:
```
#Looking at the statistical property of columns
df.describe()
```

Out[19]:

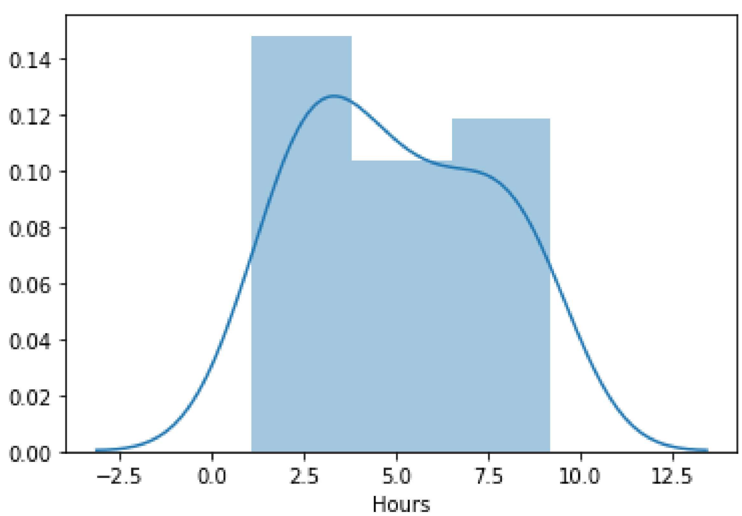
	Hours	Scores
count	25.000000	25.000000
mean	5.012000	51.480000
std	2.525094	25.286887
min	1.100000	17.000000
25%	2.700000	30.000000
50%	4.800000	47.000000
75%	7.400000	75.000000
max	9.200000	95.000000

In [21]:
```
#Checking for correlation in our data to check linearity assumption in Linear Re
df.corr()
```

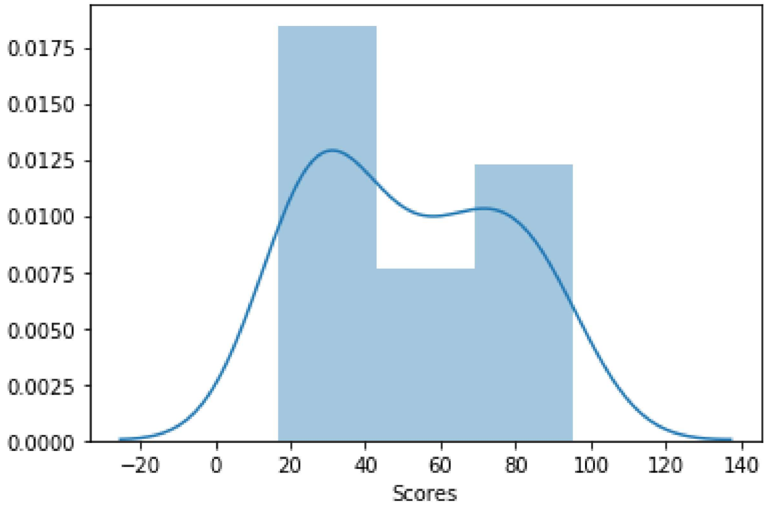
Out[21]:

	Hours	Scores
Hours	1.000000	0.976191
Scores	0.976191	1.000000

In [22]:
```
#Univariate Analysis
hour=sns.distplot(df['Hours'])
```

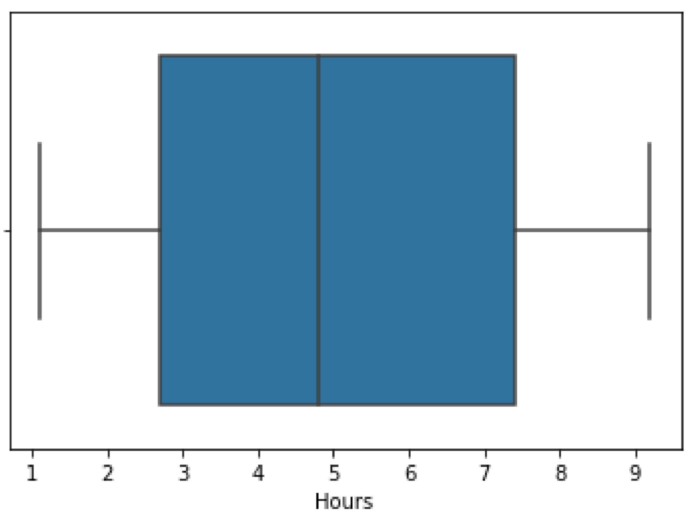


In [24]:
```
Score=sns.distplot(df["Scores"])
```



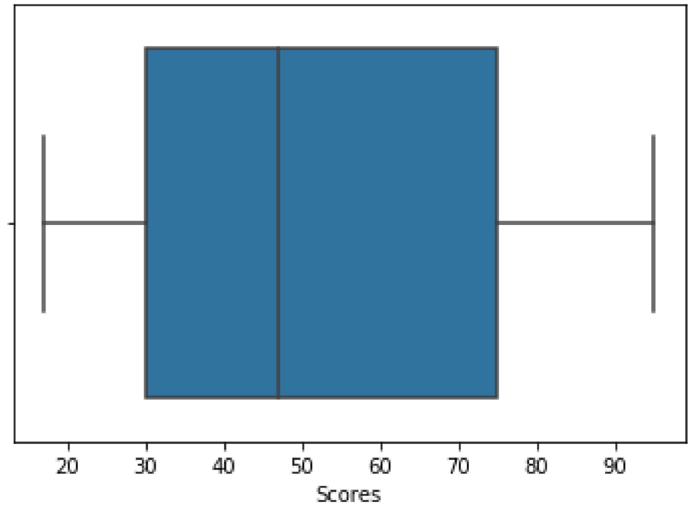
In [39]:
```
Hours=sns.boxplot(df['Hours'])

#No outlier
```



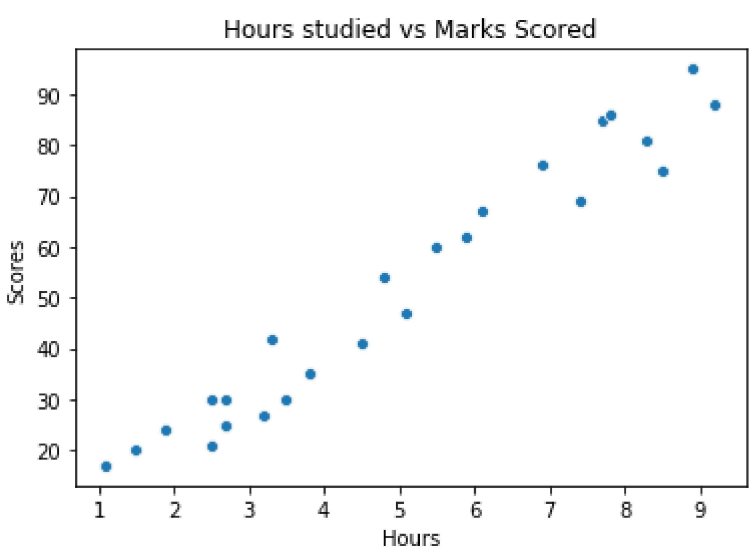
In [34]:
```
Score=sns.boxplot(df["Scores"])

#No outliers
```



In [33]:
```
#Bivariate Analysis
sns.scatterplot(df["Hours"],df["Scores"]);
plt.title("Hours studied vs Marks Scored");

#Data is positive correlated
```



In [68]:
```
#Assigning column to dependent and independent variable
X=df['Hours'].values.reshape(-1,1)
y=df['Scores'].values
```

In [69]:
```
#Splitting our data for training and predicting purpose
X_train,X_test,y_train,y_test=ts(X,y,test_size=0.2)
```

In [70]:
```
print(X_train.shape)
print(X_test.shape)
```

```
(20, 1)
(5, 1)
```

In [71]:
```
print(y_train.shape)
print(y_test.shape)
```

```
(20,)
(5,)
```

In [77]:
```
#Training our model
model=LinearRegression()
model.fit(X_train,y_train)
```

Out[77]:
```
LinearRegression(copy_X=True, fit_intercept=True, n_jobs=None, normalize=False)
```

In [88]:
```
print(model.coef_)
print(model.intercept_)

#Interpreting Model Coefficient
#A"Unit" increase in number of hours studied is associated with 9.955"units" in r
```

```
[9.95084503]
1.4847149599514253
```

In [89]:
```
#Making prediction using test data
y_pred=model.predict(X_test)
```

In [90]:
```
#Comparing actual vs predicted scores
df = pd.DataFrame({'Actual': y_test, 'Predicted': y_pred})
df
```

Out[90]:

	Actual	Predicted
0	30	26.361828
1	67	62.184870
2	81	84.076729
3	69	75.120968
4	60	56.214363

In [118]:
```
#Evaluating our model
print("Mean absolute error is ",mean_absolute_error(y_pred,y_test))
print("r square value is",r2_score(y_pred,y_test))
```

```
Mean absolute error is  4.2873274190705635
r square value is 0.9500542668240033
```

In [119]:
```
#Conclusion
p=model.predict([[9.25]])
print("Number of hours studied are %f and predicted score is %f"%(9.25,p))
```

```
Number of hours studied are 9.250000 and predicted score is 93.530032
```

In [ ]:
```
```