The Sparks Foundation (Internship)

Task 2: Supervised Learning - Linear Regression

In [1]:
```
# Importing all libraries required
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
%matplotlib inline
import seaborn as sns

import warnings
warnings.simplefilter("ignore")

#ALL ML Algo Libraries

from sklearn.model_selection import train_test_split
from sklearn.linear_model import LinearRegression
from sklearn.metrics import mean_absolute_error , mean_squared_error
```

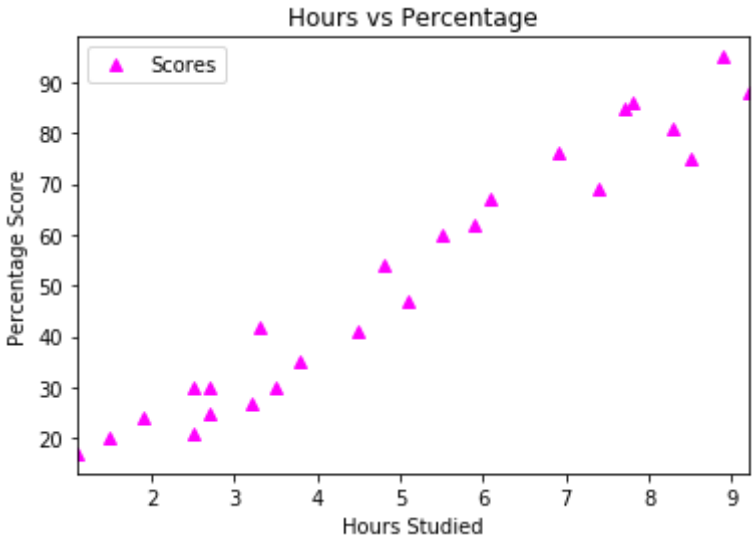
In [2]:
```
#importing dataset
url = "http://bit.ly/w-data"
data = pd.read_csv(url)
print("Data imported successfully !")

data.tail(10)
```

```
Data imported successfully !
```

Out[2]:

	Hours	Scores
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

In [3]:
```
# Plotting the distribution of scores
data.plot(x='Hours', y='Scores', color='magenta',style='^')
plt.title('Hours vs Percentage')
plt.xlabel('Hours Studied')
plt.ylabel('Percentage Score')
plt.show()
```



There is a positive linear relation between the number of hours studied and percentage of score.

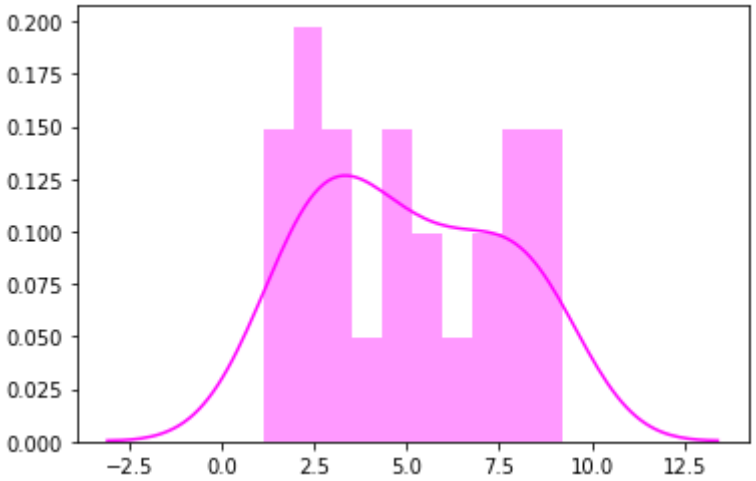
Preparing the data

The next step is to divide the data into "x" (inputs) and "y" (outputs).

In [4]:
```
x = data.iloc[:, :-1].values
y = data.iloc[:, 1].values
```

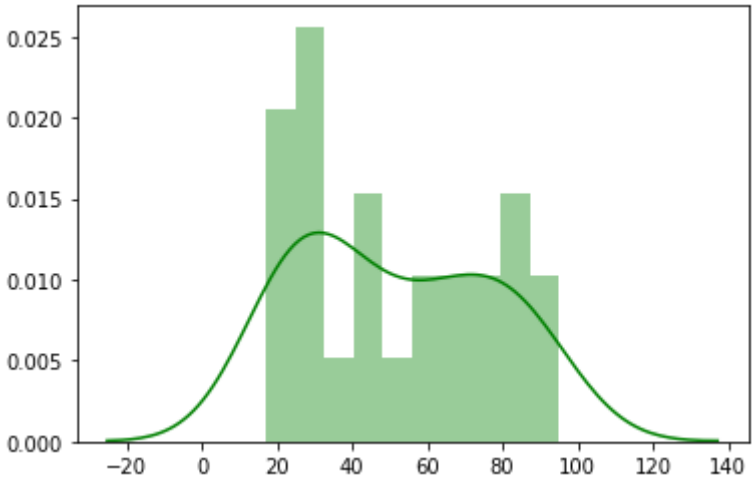
In [5]:
```
sns.distplot(x,bins=10, color='magenta')
```

Out[5]:
```
<matplotlib.axes._subplots.AxesSubplot at 0x1e939d34cc8>
```



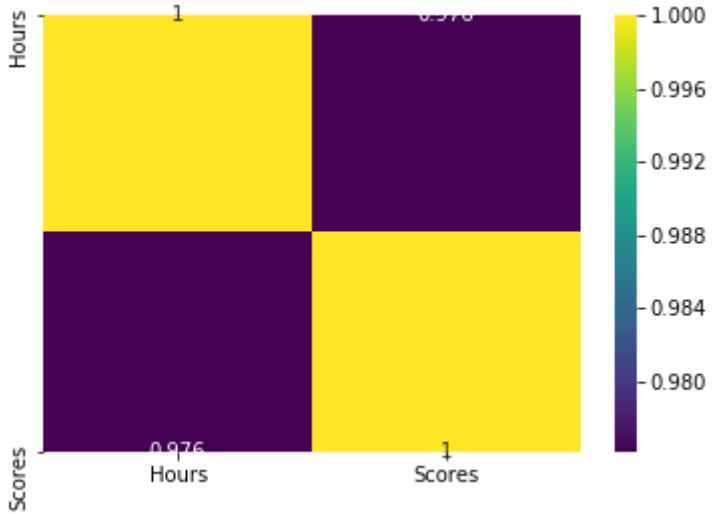
In [6]:
```
sns.distplot(y,bins=10, color='green')
```

Out[6]:
```
<matplotlib.axes._subplots.AxesSubplot at 0x1e93a003f88>
```



In [7]:
```
sns.heatmap(data.corr(),cmap='viridis',annot=True ,fmt='.3g')
```

Out[7]: <matplotlib.axes._subplots.AxesSubplot at 0x1e93a0f7188>



In [8]:
```
print(x)
print('\n', y)
```

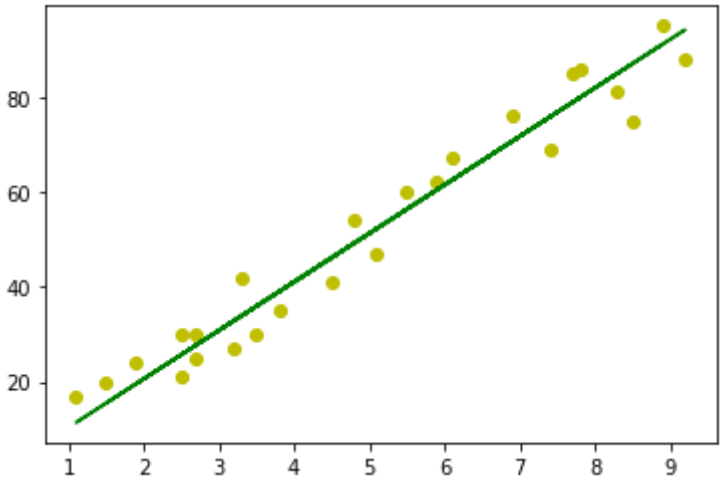
```
[[2.5]
 [5.1]
 [3.2]
 [8.5]
 [3.5]
 [1.5]
 [9.2]
 [5.5]
 [8.3]
 [2.7]
 [7.7]
 [5.9]
 [4.5]
 [3.3]
 [1.1]
 [8.9]
 [2.5]
 [1.9]
 [6.1]
 [7.4]
 [2.7]
 [4.8]
 [3.8]
 [6.9]
 [7.8]]

 [21 47 27 75 30 20 88 60 81 25 85 62 41 42 17 95 30 24 67 69 30 54 35 76
 86]
```

In [9]:
```
#Scikit-Learn's built-in train_test_split() method:

X_train, X_test, y_train, y_test = train_test_split(x, y,test_size=0.38, random_state=1)
```

In [10]:
```
#Training the Algorithm

linear = LinearRegression()
linear.fit(X_train, y_train)
```

Out[10]:
```
LinearRegression(copy_X=True, fit_intercept=True, n_jobs=None, normalize=False)
```

In [11]:
```
# Plotting the regression line
line = linear.coef_* x+ linear.intercept_

# Plotting for the test data
plt.scatter(x, y,color='y')
plt.plot(x, line , color='g')
plt.show()
```



In [12]:
```
#making predictions

print(X_test) # Testing data - In Hours
y_pred = linear.predict(X_test) # Predicting the scores
```

```
[[1.1]
 [3.3]
 [1.9]
 [8.5]
 [4.8]
 [7.7]
 [6.1]
 [7.4]
 [3.5]
 [3.2]]
```

In [13]:
```
# Comparing Actual vs Predicted
df = pd.DataFrame({'Actual': y_test, 'Predicted': y_pred})
df
```

Out[13]:

	Actual	Predicted
0	17	11.374353
1	42	33.854718
2	24	19.549031
3	75	86.990125
4	54	49.182239
5	85	78.815447
6	67	62.466091
7	69	75.749943
8	30	35.898387
9	27	32.832883

In [14]:
```
# You can also test with your own data
hours = [[9.25]]
own_pred = linear.predict(hours)
print("No of Hours = {}".format(hours))
print("Predicted Score = {}".format(own_pred[0]))
```

```
No of Hours = [[9.25]]
Predicted Score = 94.65388540708372
```

In [15]:
```
print('Mean Absolute Error:', mean_absolute_error(y_test, y_pred))
```

```
Mean Absolute Error: 6.422945894664219
```

In [16]:
```
print('Root Mean Squared Error:', np.sqrt(mean_squared_error(y_test, y_pred)) )
```

```
Root Mean Squared Error: 6.767265430574753
```

The model is giving 94.654% accuracy with mean error as 6.4. And the distribution is done as test split =0.38