In [146…

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

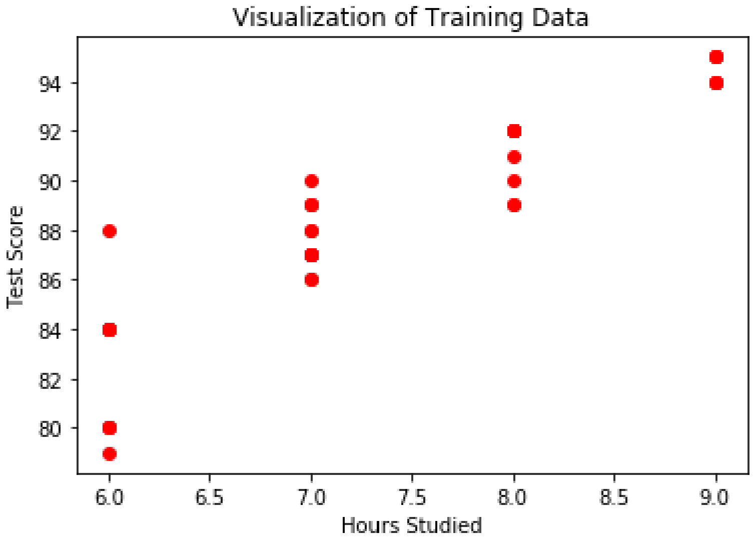
1. Load the dataset into a pandas dataframe and visualize the relationship between each input attribute and the test scores using a scatter plot.

In [147…

```
df = pd.read_csv("data.csv")
```

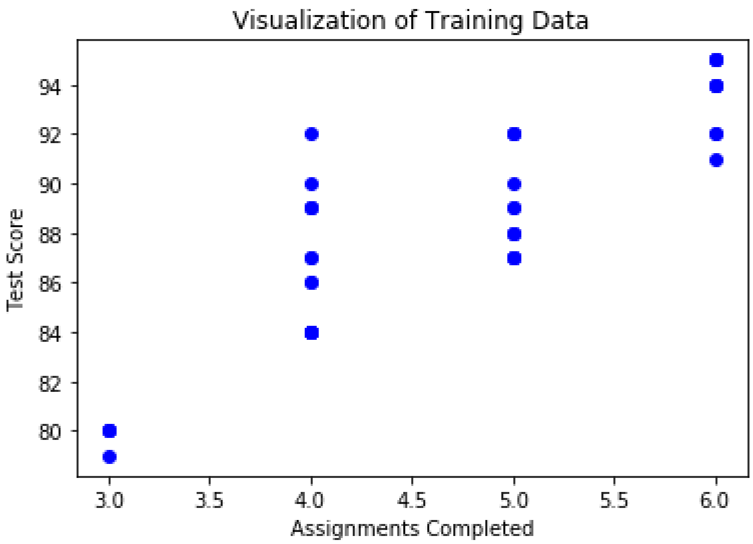
In [148…

```
plt.scatter(df["Hours Studied"], df["Test Score"], color="red")
plt.title("Visualization of Training Data")
plt.xlabel("Hours Studied")
plt.ylabel("Test Score")
plt.show()
```



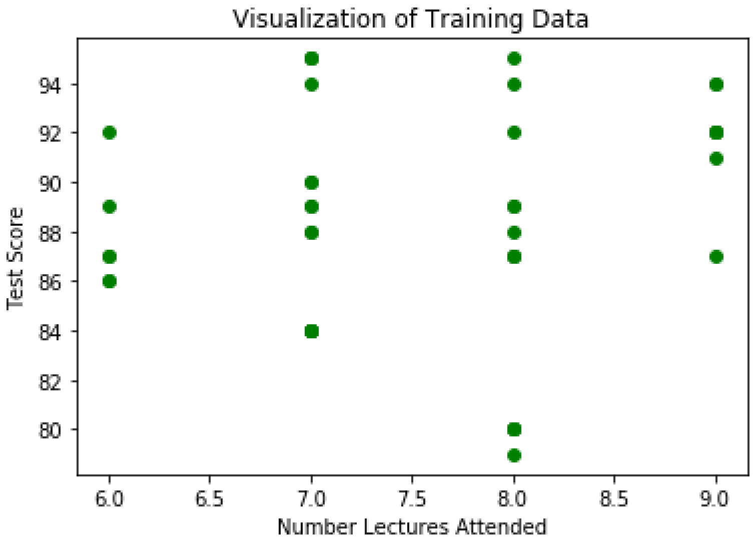
In [149…

```
plt.scatter(df["Assignments Completed"], df["Test Score"], color="blue")
plt.title("Visualization of Training Data")
plt.xlabel("Assignments Completed")
plt.ylabel("Test Score")
plt.show()
#plt.scatter(df["Lecture Attended"], df["Test Score"], color="green")
#plt.scatter(df["Questions Asked"], df["Test Score"], color="purple")
```



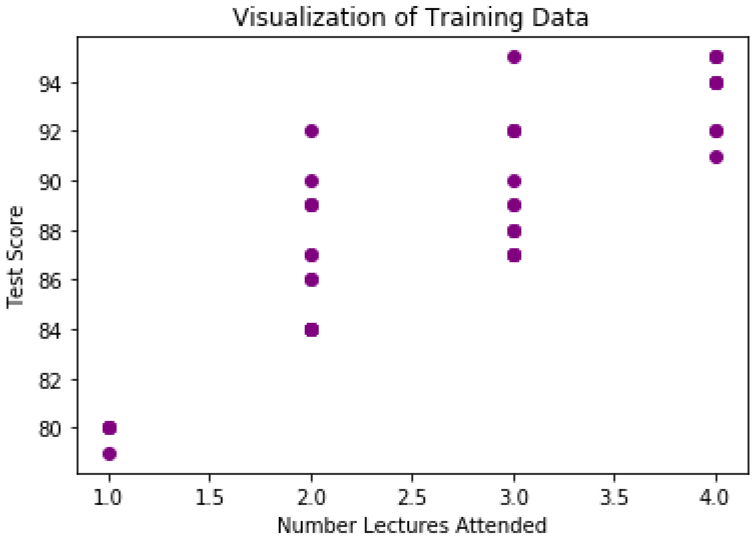
In [150…

```
plt.scatter(df["Lecture Attended"], df["Test Score"], color="green")
plt.title("Visualization of Training Data")
plt.xlabel("Number Lectures Attended")
plt.ylabel("Test Score")
plt.show()
```



In [151…

```
plt.scatter(df["Questions Asked"], df["Test Score"], color="purple")
plt.title("Visualization of Training Data")
plt.xlabel("Number Lectures Attended")
plt.ylabel("Test Score")
plt.show()
```

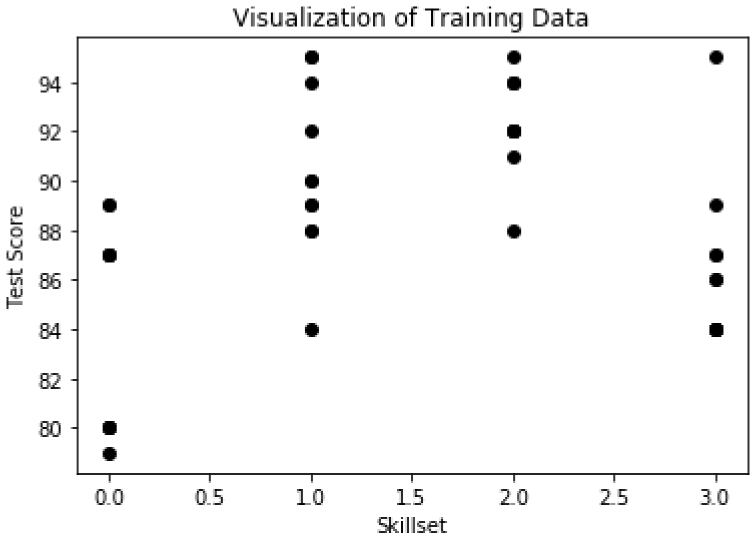


In [152…

```
from sklearn.preprocessing import LabelEncoder, OneHotEncoder
from sklearn.compose import ColumnTransformer

xSkills = df.iloc[:, :-1].values
le = LabelEncoder()
xSkills[:, 5] = le.fit_transform((xSkills[:, 5]))

plt.scatter(xSkills[:, 5], df["Test Score"], color="black")
plt.title("Visualization of Training Data")
plt.xlabel("Skillset")
plt.ylabel("Test Score")
plt.show()
```



1. Split the data into training and testing datasets (80% training data, 20% testing data).

In [153…

```
x = df.iloc[:, 0:1].values
y = df.iloc[:, -1].values
```

In [154…

```
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, rando
```

1. Implement simple linear regression to predict test scores based on the hours studied. Evaluate the model's performance using mean squared error (MSE) and other relevant metrics.

In [155…

```
from sklearn.linear_model import LinearRegression
lRegressor = LinearRegression()
lRegressor.fit(x_train, y_train)
```

Out[155]:

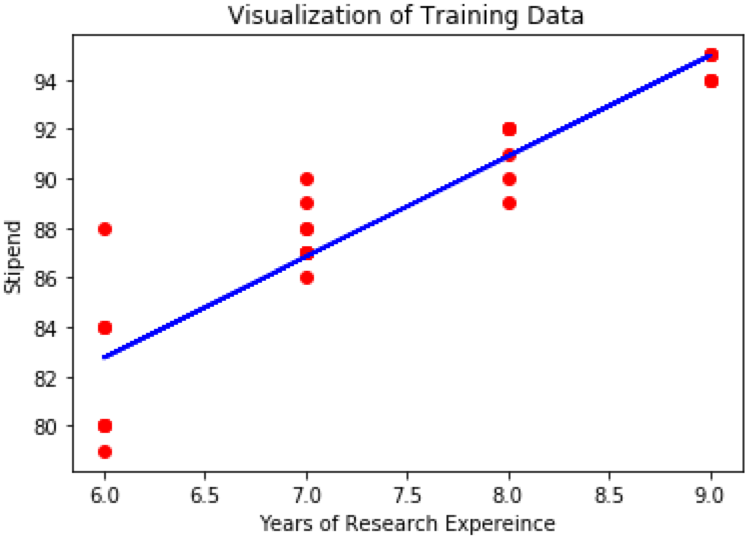
```
LinearRegression()
```

In [156…

```
# Predicting the test set results...
y_pred = lRegressor.predict(x_test)
```

In [157…

```
from sklearn import metrics
# visualizing data...
plt.scatter(x_train, y_train, color="red")
plt.plot(x_train, lRegressor.predict(x_train), color = "blue")
plt.title("Visualization of Training Data")
plt.xlabel("Years of Research Expereince")
plt.ylabel("Stipend")
plt.show()
```



In [158…

```
from sklearn import metrics
# you can compare outputted values of y_pred to y_test to see how close our pr
print(metrics.mean_squared_error(y_test, y_pred))   # error = high b/c of low
print(metrics.mean_absolute_error(y_test, y_pred))
```

```
2.3080147509342
1.444144953578918
```

1. Handle Categorical attribute Skill Set

In [159…

```
from sklearn.preprocessing import LabelEncoder, OneHotEncoder
from sklearn.compose import ColumnTransformer
```

In [160…

```
x2 = df.iloc[:, :-1]
```

In [161…

```
ct = ColumnTransformer([("Skillset", OneHotEncoder(), [5])], remainder="passth
x2 = np.array(ct.fit_transform(x2))

# avoiding dummy variable trap
x2 = x2[:, 1:]
```

1. Implement multiple linear regression to predict test scores based on the number of hours studied and other relevant features. Evaluate the performance of the model.

In [162…

```
x_train2, x_test2, y_train2, y_test2 = train_test_split(x2, y, test_size=0.2,

from sklearn.linear_model import LinearRegression
lr = LinearRegression()
lr.fit(x_train2, y_train2)

# predict test results
y_pred2 = lr.predict(x_test2)

from sklearn import metrics
# you can compare outputted values of y_pred to y_test to see how close our pr
print(metrics.mean_squared_error(y_test2, y_pred2))   # error = high b/c of lo
print(metrics.mean_absolute_error(y_test2, y_pred2))
```

```
2.57920410580577
1.3098181828193607
```

1. Identify the importance of attributes in predicting the test scope on the basis of their P-value.

In [163…

```
import statsmodels.api as sma
pVal = sma.OLS(x_train2, y_train2)
results = pVal.fit()
results.params
```

Out[163]:

```
array([[0.002989  , 0.00302905, 0.00253391, 0.0840378 , 0.05403132,
        0.08504627, 0.03114237, 0.02464012]])
```

Recall: if p-value > 0.05, we will reject the Ho. Else, we will accept it. We have three columns with p-values > 0.05 that will be accepted.

1. Implement polynomial linear regression to predict test scores based on the number of hours studied. Evaluate the performance of the model.

In [164…

```
# Creating Data Frames
X3 = df.iloc[:, 0:1].values
y3 = df.iloc[:, -1].values
```

In [165…

```
from sklearn.preprocessing import PolynomialFeatures
polyReg = PolynomialFeatures(degree = 6)
xPoly = polyReg.fit_transform(X3)
```

In [166…

```
#Training the Polynomial Regression model on the whole dataset
from sklearn.linear_model import LinearRegression
```

```
polyModel = LinearRegression()
polyModel.fit(xPoly, y3)
```

Out[166]:

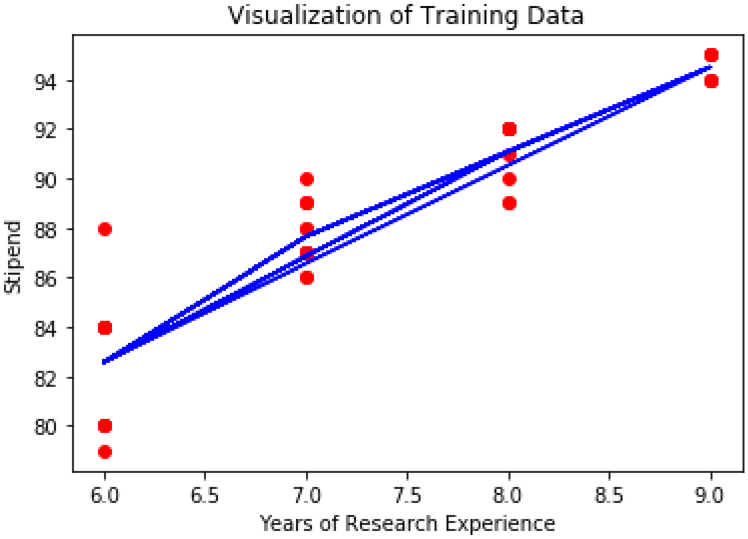
```
LinearRegression()
```

In [167…

```
# Visualising the Training set results
plt.scatter(X3, y3, color = 'red')
plt.title('Visualization of Training Data')
plt.xlabel('Years of Research Experience')
plt.ylabel('Stipend')
plt.plot(X3, polyModel.predict(xPoly), color = 'blue')
```

Out[167]:

```
[<matplotlib.lines.Line2D at 0x7fac8119d760>]
```



In [168…

```
polyModel.predict(polyReg.fit_transform([[6.5]]))
```

Out[168]:

```
array([85.30743795])
```