1. IMPORT LIBRARY

```
import pandas as pd
import numpy as np
from sklearn.preprocessing import LabelEncoder
from sklearn.metrics import
r2_score,mean_absolute_error,mean_squared_error
import matplotlib.pyplot as plt
from sklearn.linear_model import LinearRegression
from sklearn.model_selection import train_test_split
```

1. Load Data

```
df=pd.read_csv(r"C:\My python Files\50_Startups.csv")
df.head()
```

```
   R&D Spend  Administration  Marketing Spend       State     Profit
0  165349.20       136897.80        471784.10    New York  192261.83
1  162597.70       151377.59        443898.53  California  191792.06
2  153441.51       101145.55        407934.54     Florida  191050.39
3  144372.41       118671.85        383199.62    New York  182901.99
4  142107.34        91391.77        366168.42     Florida  166187.94
```

1. Clean Data

```
df.isnull().sum()
```

```
R&D Spend          0
Administration     0
Marketing Spend    0
State              0
Profit             0
dtype: int64
```

```
df.drop_duplicates(inplace=True)
df.head()
```

```
   R&D Spend  Administration  Marketing Spend       State
Profit  \
0  165349.20       136897.80        471784.10    New York  192261.83

1  162597.70       151377.59        443898.53  California  191792.06

2  153441.51       101145.55        407934.54     Florida  191050.39

3  144372.41       118671.85        383199.62    New York  182901.99

4  142107.34        91391.77        366168.42     Florida  166187.94


   State_Encoded
0              2
```

```
1               0
2               1
3               2
4               1
```

4.Preprocess Data

```
le=LabelEncoder()
df['State_Encoded']=le.fit_transform(df['State'])
df.head()
```

```
   R&D Spend  Administration  Marketing Spend       State
Profit  \
0  165349.20       136897.80        471784.10    New York  192261.83

1  162597.70       151377.59        443898.53  California  191792.06

2  153441.51       101145.55        407934.54     Florida  191050.39

3  144372.41       118671.85        383199.62    New York  182901.99

4  142107.34        91391.77        366168.42     Florida  166187.94


   State_Encoded
0              2
1              0
2              1
3              2
4              1
```

5.Split Data

```
X=df[['R&D Spend','Administration','Marketing Spend','State_Encoded']]
Y=df['Profit']

X_train,X_test,Y_train,Y_test=train_test_split(X,Y,test_size=0.2,rando
m_state=42)
```

6.Create and Train Model

```
profit_model=LinearRegression()
profit_model.fit(X_train,Y_train)

LinearRegression()
```

7.Test the Model

```
rd=float(input("Enter the amount spent on resarch and Development: "))
adm=float(input("Enter the administation expense: "))
ms=float(input("Enter the Marketing expense: "))
st=input("Enter your state: ")
```

```
Enter the amount spent on resarch and Development:  12132
Enter the administation expense:  121232
Enter the Marketing expense:  12143
Enter your state:  New York
```

```
state_encoded=le.transform([st])[0]
print(state_encoded)
```

```
2
```

```
result=profit_model.predict([[rd,adm,ms,state_encoded]])
print("The predicted Profit is: ",result[0])
```

```
The predicted Profit is:  55945.41745255775
```

```
C:\Users\DELL\anaconda3\Lib\site-packages\sklearn\base.py:439:
UserWarning: X does not have valid feature names, but LinearRegression
was fitted with feature names
  warnings.warn(
```

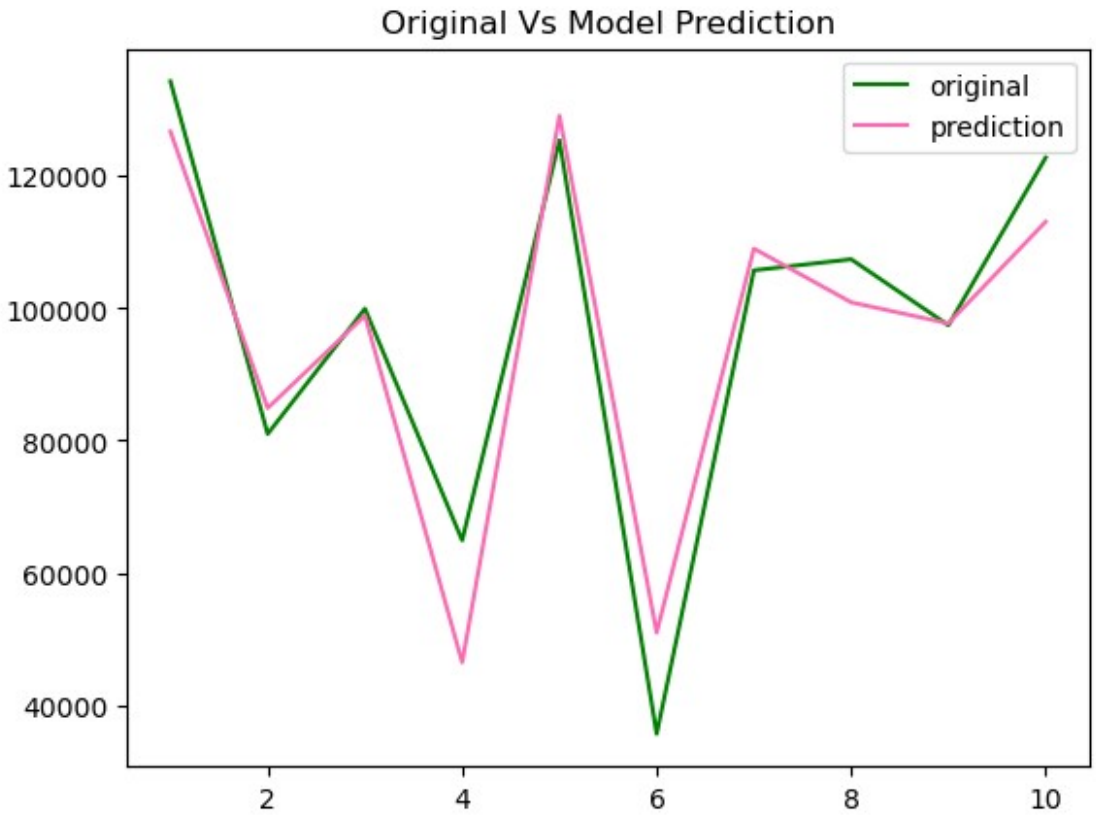
8.Evalution

```
model_prediction=profit_model.predict(X_test)
```

```
len(Y_test)
```

```
10
```

```
plt.plot(np.arange(1,11),Y_test,color='green',label="original")
plt.plot(np.arange(1,11),model_prediction,color='hotpink',label="predi
ction")
plt.title("Original Vs Model Prediction")
plt.legend()
plt.show()
```




```
r2score=r2_score(Y_test,model_prediction)
print(r2score)
if r2score>0.5:
    print("Model is good fit")
else:
    print("Model is not good fit")
```

```
0.9000614254946402
Model is good fit
```

```
mae=mean_absolute_error(Y_test,model_prediction)
print(mae)
```

```
6979.17574672139
```

```
mse=mean_squared_error(Y_test,model_prediction)
print(mse)
```

```
80929465.49097784
```