Problem 1

import library

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

read dataset

```
data = pd.read_csv("/content/data.csv")
```

```
data
```

	F	N	Prprice per square foot
0	0.44	0.68	511.14
1	0.99	0.23	717.10
2	0.84	0.29	607.91
3	0.28	0.45	270.40
4	0.07	0.83	289.88
...	...	...	...
95	0.99	0.13	636.22
96	0.28	0.46	272.12
97	0.87	0.36	696.65
98	0.23	0.87	434.53
99	0.77	0.36	593.86

100 rows × 3 columns

```
data.isnull().sum()
```

```
F                          0
N                          0
Prprice per square foot    0
dtype: int64
```

```
data.shape
```

```
(100, 3)
```

```
data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 100 entries, 0 to 99
Data columns (total 3 columns):
 #   Column                    Non-Null Count  Dtype  
---  ------                    --------------  -----  
 0   F                         100 non-null    float64
 1   N                         100 non-null    float64
 2   Prprice per square foot   100 non-null    float64
dtypes: float64(3)
memory usage: 2.5 KB
```

```
data.describe()
```

	F	N	Prprice per square foot
count	100.000000	100.000000	100.000000
mean	0.550300	0.501700	554.214600
std	0.293841	0.307124	347.312796
min	0.010000	0.000000	42.080000
25%	0.300000	0.230000	278.172500
50%	0.570000	0.485000	514.285000
75%	0.822500	0.760000	751.752500
max	1.000000	0.990000	1563.820000

scaling data

```
from sklearn.preprocessing import StandardScaler
sc= StandardScaler()
allsc = sc.fit_transform(data)
```

```
df = pd.DataFrame(allsc)
```

```
df.head()
```

```
x = df.iloc[:,0:2].values
y=df.iloc[:,-1].values
```

```
      1   1.503928  -0.889115   0.471350
```

splitting data

```
from sklearn.model_selection import train_test_split
x_train, x_test, y_train, y_test = train_test_split(x,y,test_size= 0.20, random_state = 0)
```

training model

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

```
LinearRegression()
```

prediction

```
y_pred = reg.predict(x_test)
```

```
y_pred
```

```
array([-0.37075684, -1.43353291,  0.34046458, -1.39946387,  0.29374307,
       -0.9160151 ,  0.10036309,  0.05071943,  0.3560392 ,  0.41882197,
        0.57018377,  1.20807714,  1.44688172,  1.72705485, -0.08149832,
       -0.44765433,  1.25058194, -1.26059389,  0.97430189,  0.43504622])
```

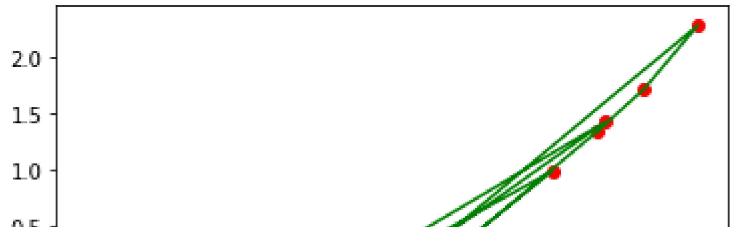
```
y_test
```

```
array([-0.55630859, -1.22534453,  0.15538128, -1.18766785,  0.05236364,
       -0.91594435, -0.10644559, -0.20570135,  0.17803938,  0.23730346,
        0.42991173,  1.3366985 ,  1.70521808,  2.27305944, -0.28655284,
       -0.61641186,  1.42325069, -1.10646912,  0.98771176,  0.24873379])
```

visualise

```
plt.scatter(y_pred, y_test, color= 'red')
plt.plot(y_pred, y_test,color = 'green')
```

```
[<matplotlib.lines.Line2D at 0x7f4d99448d10>]
```



F is the number of observed features. N is the number of rows both are consider as independent variable x. y is dependent. It is price per square foot. Apply Multiple Regression model. Then plot scatter plot for visualise regression line.

PROBLEM 2

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

```
data = pd.read_csv("/content/dataset.csv")
```

```
data
```

	id	age	income	gender	marital status	buys
0	1	<21	high	male	single	no
1	2	<21	high	male	married	no
2	3	21-35	high	male	single	yes
3	4	>35	medium	male	single	yes
4	5	>35	low	female	single	yes
5	6	>35	low	female	married	no
6	7	21-35	low	female	married	yes
7	8	<21	medium	male	single	no
8	9	<21	low	female	married	yes
9	10	>35	medium	female	single	yes
10	11	<21	medium	female	married	yes
11	12	21-35	medium	male	married	yes
12	13	21-35	high	female	single	yes
13	14	>35	medium	male	married	no

```
df= data.drop(["id"], axis=1)
```

```
df
```

	age	income	gender	marital status	buys
0	<21	high	male	single	no
1	<21	high	male	married	no
2	21-35	high	male	single	yes
3	>35	medium	male	single	yes
4	>35	low	female	single	yes
5	>35	low	female	married	no
6	21-35	low	female	married	yes
7	<21	medium	male	single	no
8	<21	low	female	married	yes
9	>35	medium	female	single	yes
10	<21	medium	female	married	yes
11	21-35	medium	male	married	yes
12	21-35	high	female	single	yes
13	>35	medium	male	married	no

```
# preprocessing

from sklearn.preprocessing import LabelEncoder
l = LabelEncoder()
df = df.apply(l.fit_transform)
```

```
df
```

	age	income	gender	marital status	buys
0	1	0	1	1	0
1	1	0	1	0	0
2	0	0	1	1	1

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

5	2	1	0	0	0

```
x
```

```
array([[1, 0, 1, 1],
       [1, 0, 1, 0],
       [0, 0, 1, 1],
       [2, 2, 1, 1],
       [2, 1, 0, 1],
       [2, 1, 0, 0],
       [0, 1, 0, 0],
       [1, 2, 1, 1],
       [1, 1, 0, 0],
       [2, 2, 0, 1],
       [1, 2, 0, 0],
       [0, 2, 1, 0],
       [0, 0, 0, 1],
       [2, 2, 1, 0]])
```

```
y
```

```
array([0, 0, 1, 1, 1, 0, 1, 0, 1, 1, 1, 1, 1, 0])
```

```
from sklearn.model_selection import train_test_split
x_train, x_test, y_train, y_test = train_test_split(x,y,test_size= 0.25, random_state = 0)
```

```
from sklearn.tree import DecisionTreeClassifier
classifier = DecisionTreeClassifier(criterion= 'entropy', random_state = 0)
classifier.fit(x_train, y_train)
```

```
DecisionTreeClassifier(criterion='entropy', random_state=0)
```

```
y_pred = classifier.predict(x_test)
```

```
y_pred
```

```
array([0, 1, 0, 1])
```

```
#Confusion Matrix
from sklearn.metrics import confusion_matrix , accuracy_score
cm = confusion_matrix(y_test , y_pred)
cm
```

```
     array([[0, 0],
            [2, 2]])
```

```
#accuracy
accuracy_score(y_test , y_pred)

     0.5
```

```
classifier.predict([[1, 2, 1, 1]])

     array([0])
```

In above type prediction is "no" i.e. Buys from single male and he is above 21 years.

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