In [1]:
```
# Anuar Konkashbaev
# class DDS-8555 v1
# Assignment 1
import pandas as pd
from sklearn import datasets
iris= pd.DataFrame(datasets.load_iris().data)
iris.columns = datasets.load_iris().feature_names
iris['type'] = datasets.load_iris().target
iris['type']=iris['type'].astype('object')
iris
```

Out[1]:

	sepal length (cm)	sepal width (cm)	petal length (cm)	petal width (cm)	type
0	5.1	3.5	1.4	0.2	0
1	4.9	3.0	1.4	0.2	0
2	4.7	3.2	1.3	0.2	0
3	4.6	3.1	1.5	0.2	0
4	5.0	3.6	1.4	0.2	0
...	...	...	...	...	...
145	6.7	3.0	5.2	2.3	2
146	6.3	2.5	5.0	1.9	2
147	6.5	3.0	5.2	2.0	2
148	6.2	3.4	5.4	2.3	2
149	5.9	3.0	5.1	1.8	2

150 rows × 5 columns

In [2]:
```
iris['new']=(iris.iloc[:,0]*iris.iloc[:,1])/(iris.iloc[:,2]*iris.iloc[:,3])
```

In [3]:
```
iris['new']
```

Out[3]:
```
0      63.750000
1      52.500000
2      57.846154
3      47.533333
4      64.285714
         ...
145     1.680602
146     1.657895
147     1.875000
148     1.697262
149     1.928105
Name: new, Length: 150, dtype: float64
```

In [4]:
```
from sklearn.model_selection import train_test_split as tts
X_train, X_test, y_train, y_test = tts(iris.iloc[:,0:3], iris.iloc[:,4], test_size=
stratify=iris.iloc[:,4])
```

In [5]:
```
X_train
```

Out[5]:

	sepal length (cm)	sepal width (cm)	petal length (cm)
8	4.4	2.9	1.4
106	4.9	2.5	4.5
76	6.8	2.8	4.8
9	4.9	3.1	1.5
89	5.5	2.5	4.0
...	...	...	...
37	4.9	3.6	1.4
2	4.7	3.2	1.3
33	5.5	4.2	1.4
52	6.9	3.1	4.9
3	4.6	3.1	1.5

120 rows × 3 columns

In [6]:
```
X_test
```

Out[6]:

	sepal length (cm)	sepal width (cm)	petal length (cm)
38	4.4	3.0	1.3
127	6.1	3.0	4.9
57	4.9	2.4	3.3
93	5.0	2.3	3.3
42	4.4	3.2	1.3
56	6.3	3.3	4.7
22	4.6	3.6	1.0
20	5.4	3.4	1.7
147	6.5	3.0	5.2
84	5.4	3.0	4.5
107	7.3	2.9	6.3
141	6.9	3.1	5.1
104	6.5	3.0	5.8
51	6.4	3.2	4.5
7	5.0	3.4	1.5
49	5.0	3.3	1.4
14	5.8	4.0	1.2
69	5.6	2.5	3.9
63	6.1	2.9	4.7
138	6.0	3.0	4.8
10	5.4	3.7	1.5
140	6.7	3.1	5.6
58	6.6	2.9	4.6
134	6.1	2.6	5.6
132	6.4	2.8	5.6
77	6.7	3.0	5.0
75	6.6	3.0	4.4
18	5.7	3.8	1.7
116	6.5	3.0	5.5
28	5.2	3.4	1.4

In [7]:
```
y_train
```

Out[7]:
```
8      0
106    2
76     1
9      0
89     1
      ..
37     0
2      0
33     0
52     1
3      0
Name: type, Length: 120, dtype: object
```

In [8]:
```
y_test
```

Out[8]:
```
38     0
127    2
57     1
93     1
42     0
56     1
22     0
20     0
147    2
84     1
107    2
141    2
104    2
51     1
7      0
49     0
14     0
69     1
63     1
138    2
10     0
140    2
58     1
134    2
132    2
77     1
75     1
18     0
116    2
28     0
Name: type, dtype: object
```

In [9]:
```
import numpy as np
from sklearn.metrics import mean_squared_error as MSE
from sklearn.metrics import mean_absolute_error as MAE
from sklearn.metrics import mean_absolute_percentage_error as MAPE
def myf(y,yhat):
    ME=np.round(np.mean(y-yhat),3)
```

```
    MPE=np.round(np.mean((y-yhat)/y),3)
    myMAE=np.round(MAE(y,yhat),3)
    myMSE=np.round(MSE(y,yhat),3)
    myMAPE=np.round(MAPE(y,yhat),3)
    print("\n","ME:", np.round(ME,3),"\n","MPE:",MPE,"\n", "MAE:",  myMAE,"\n", "MS
est1=np.mean(X_train['petal length (cm)'])
est2=np.mean(X_train['sepal length (cm)']-X_train['petal length (cm)']) # I changea
est1=[est1]*len(y_test)
est2=[est2]*len(y_test)
print("est1: ")
myf(X_test['sepal width (cm)'],est1)
print("est2: ")
myf(X_test['sepal width (cm)'],est2)
```

```
est1:

 ME: -0.677
 MPE: -0.237
 MAE: 0.694
 MSE: 0.602
 MAPE: 0.242
est2:

 ME: 1.022
 MPE: 0.32
 MAE: 1.022
 MSE: 1.188
 MAPE: 0.32
```

In [10]:

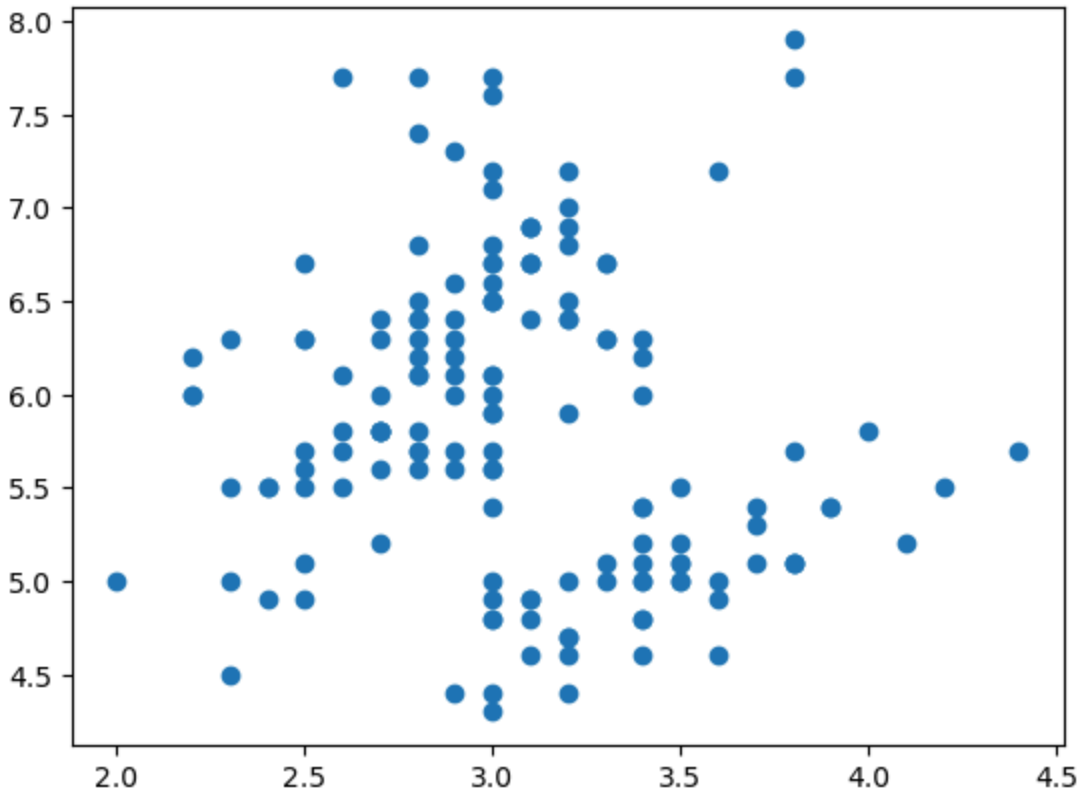
```
from sklearn.metrics import confusion_matrix as cm, ConfusionMatrixDisplay as cmd
from sklearn.metrics import classification_report as cr
import matplotlib.pyplot as plt
from numpy import percentile
est3=percentile(X_train['sepal length (cm)'], [25, 50])
y_hat=np.zeros(len(y_test))
y_hat[X_test['sepal length (cm)']>est3[0]]=1
y_hat[X_test['sepal length (cm)']>est3[1]]=2
y_hat=y_hat.astype('int')
print(cr(y_test.astype('int'),y_hat))
est4=percentile(X_train['sepal length (cm)'], [50,75])
y_hat2=np.zeros(len(y_test))
y_hat2[X_test['sepal length (cm)']>est4[0]]=1 # I changed est3 to est4
y_hat2[X_test['sepal length (cm)']>est4[1]]=2 # I changed est3 to est4
y_hat2=y_hat2.astype('int')
print(cr(y_test.astype('int'),y_hat2))
```

	precision	recall	f1-score	support
0	0.71	0.50	0.59	10
1	0.33	0.20	0.25	10
2	0.59	1.00	0.74	10
accuracy			0.57	30
macro avg	0.55	0.57	0.53	30
weighted avg	0.55	0.57	0.53	30

	precision	recall	f1-score	support
0	0.69	0.90	0.78	10
1	0.38	0.30	0.33	10
2	0.67	0.60	0.63	10
accuracy			0.60	30
macro avg	0.58	0.60	0.58	30
weighted avg	0.58	0.60	0.58	30

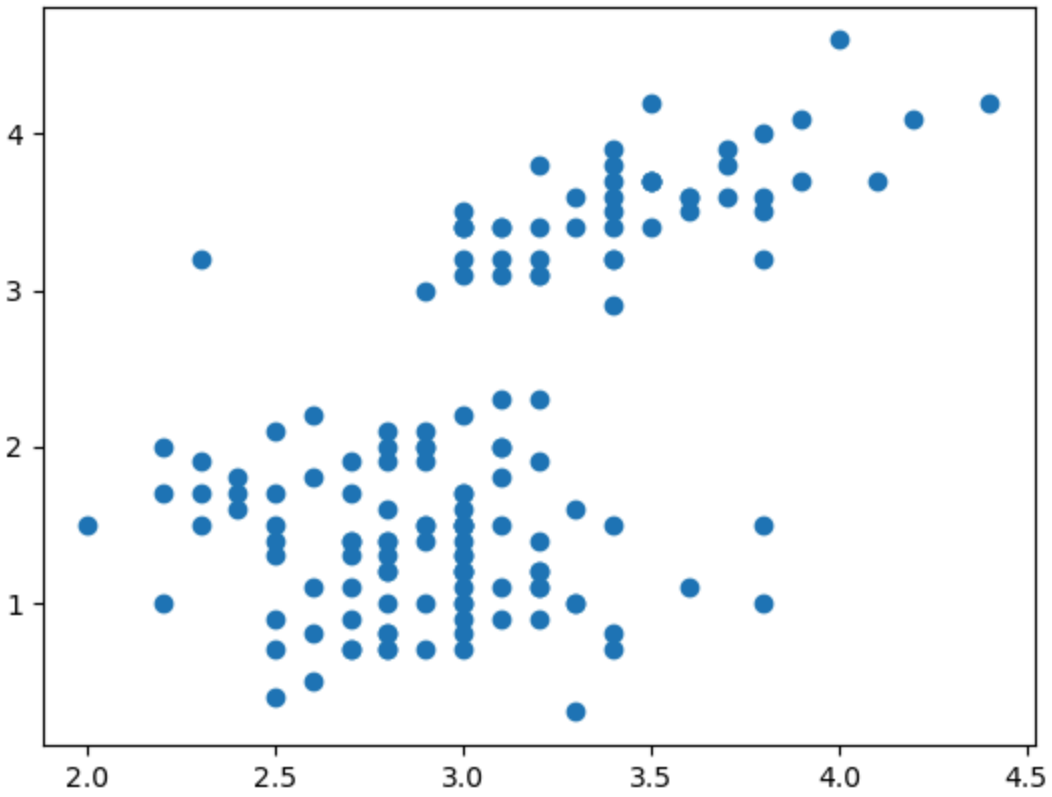
In [11]:
```
plt.scatter(iris['sepal width (cm)'],iris['sepal length (cm)'])
```

Out[11]: <matplotlib.collections.PathCollection at 0x28a21b10140>



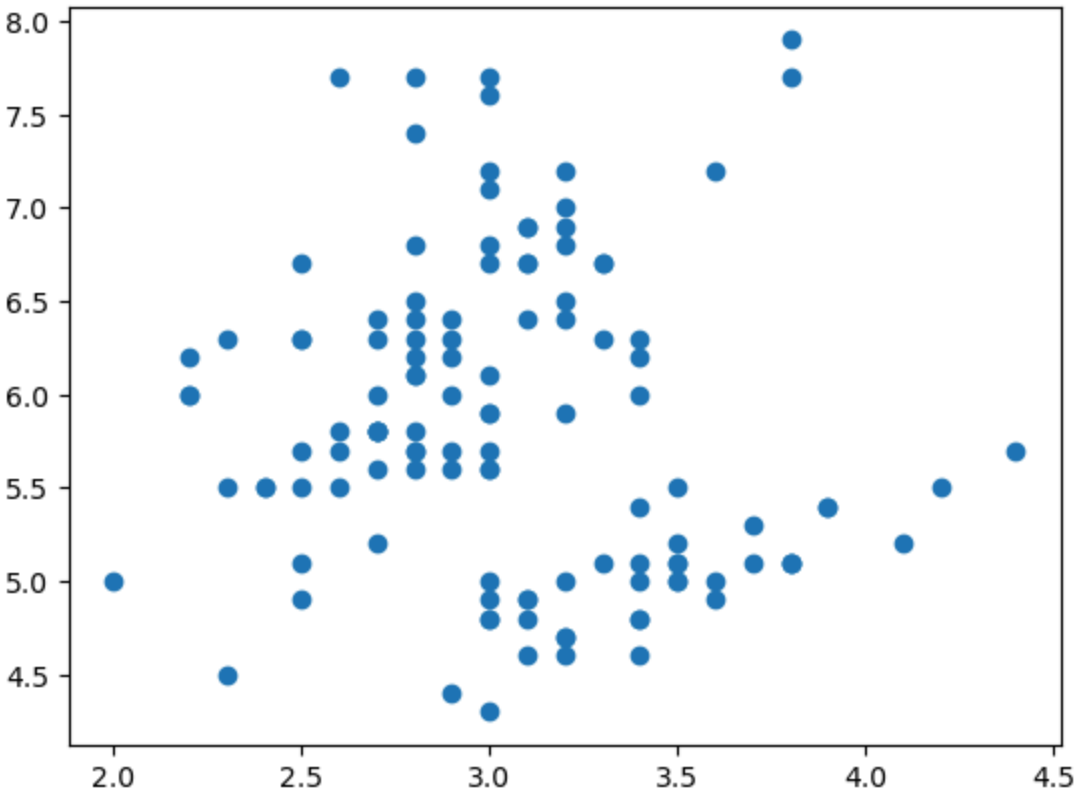
In [12]:
```
plt.scatter(iris['sepal width (cm)'],iris['sepal length (cm)']-iris['petal length (
```

Out[12]: <matplotlib.collections.PathCollection at 0x28a21ae6300>



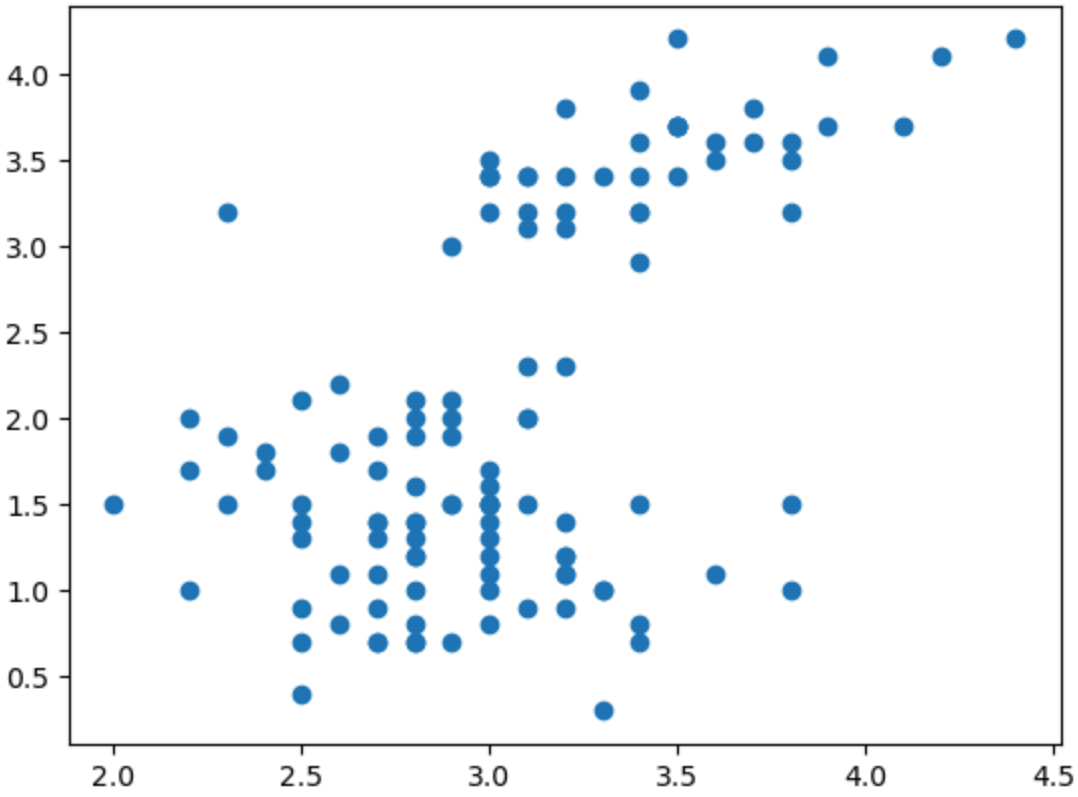
In [13]:
```
plt.scatter(X_train['sepal width (cm)'],X_train['sepal length (cm)'])
```

Out[13]: <matplotlib.collections.PathCollection at 0x28a21bd99d0>



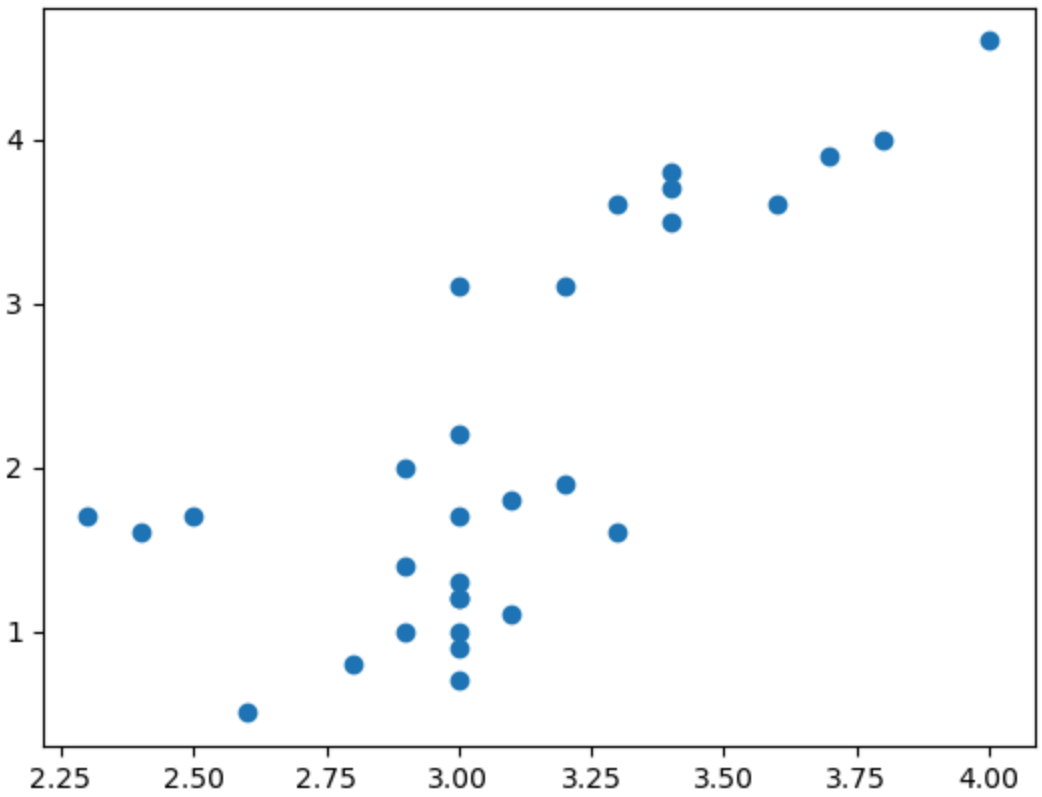
In [14]:
```
plt.scatter(X_train['sepal width (cm)'],X_train['sepal length (cm)']-X_train['petal
```

Out[14]: <matplotlib.collections.PathCollection at 0x28a21c41d90>



In [15]:
```
plt.scatter(X_test['sepal width (cm)'],X_test['sepal length (cm)']-X_test['petal le
```

Out[15]: <matplotlib.collections.PathCollection at 0x28a21bd9e20>



In [ ]:

In [ ]: