In [70]:

```
import random
import math
import numpy as np

def random_centers(data,k):
    data_ = np.array(data)
    centres_list = []
    for x in range(0,k):
        temp_rand = np.random.randint( 0,high = 1999)
        temp = data_[temp_rand]
        centres_list.append(temp)
        data_ = np.delete(data_,temp,axis = 0)
    return((centres_list))




def assign_data_centers(data, k,centres):
    thePartition = [[] for _ in range(0,k)]  # list of k empty lists

    c = np.array(centres)
    dp = np.array(data)


    for a in dp:
        temp_norm = np.linalg.norm((c-a),axis =1 )
        minn = temp_norm.min()
        temp_list = list(temp_norm)
        thePartition[temp_list.index(minn)].append(a)

    return thePartition




def revalaute_centres(data_with_centres,k):
    data = data_with_centres
    new_centres=[]
    for x in data:
        temp = np.array(x)
        temp_m = temp.mean(axis = 0)
        new_centres.append(temp_m)
    return(new_centres)
```

In [71]:

```
import pandas as pd
data = pd.read_csv('ShapedData.csv',header = None)
```

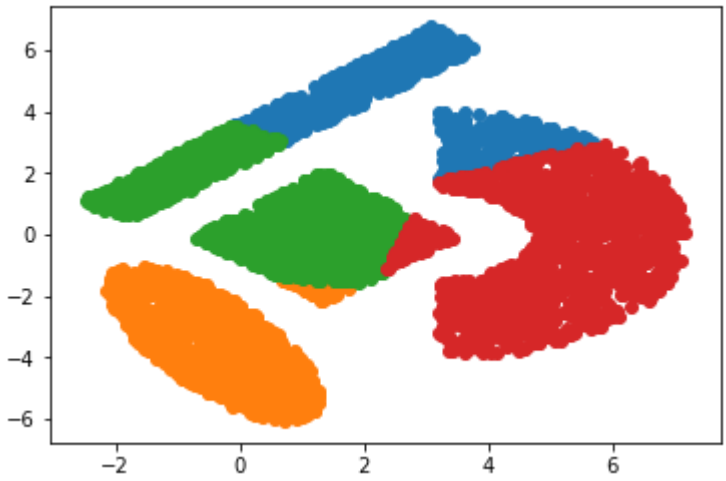
In [72]:

```
k = 4

C = random_centers(data,k)
D_C_2 = assign_data_centers(data,k,C)
tol = 1
while tol > 0.00001:

    N_C = revalaute_centres(D_C_2,k)
    D_C_1 = D_C_2
    D_C_2 = assign_data_centers(data,k,N_C)
    temp_sum = 0

    tol = tol/10
```

```
C:\Users\Karthik\Anaconda3\lib\site-packages\ipykernel_launcher.py:12: Depre
cationWarning: using a non-integer array as obj in delete will result in an
error in the future
  if sys.path[0] == '':
C:\Users\Karthik\Anaconda3\lib\site-packages\ipykernel_launcher.py:12: Futur
eWarning: in the future negative indices will not be ignored by `numpy.delet
e`.
  if sys.path[0] == '':
```

In [73]:

```
import matplotlib.pyplot as plt
plt.plot()
for i in D_C_2:
    plt.scatter(pd.DataFrame(i)[0],pd.DataFrame(i)[1])

plt.show()
```




In [74]:

```
import pandas as pd
data_2 = pd.read_csv('clustering.csv', header=None)
```

In [75]:

```
k = 4

C = random_centers(data_2,k)
D_C_2 = assign_data_centers(data_2,k,C)
tol = 1
while tol > 0.00001:

    N_C = revalaute_centres(D_C_2,k)
    D_C_1 = D_C_2
    D_C_2 = assign_data_centers(data_2,k,N_C)
    temp_sum = 0

    tol = tol/10
```

```
C:\Users\Karthik\Anaconda3\lib\site-packages\ipykernel_launcher.py:12: Depre
cationWarning: using a non-integer array as obj in delete will result in an
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  if sys.path[0] == '':
C:\Users\Karthik\Anaconda3\lib\site-packages\ipykernel_launcher.py:12: Futur
eWarning: in the future negative indices will not be ignored by `numpy.delet
e`.
  if sys.path[0] == '':
```
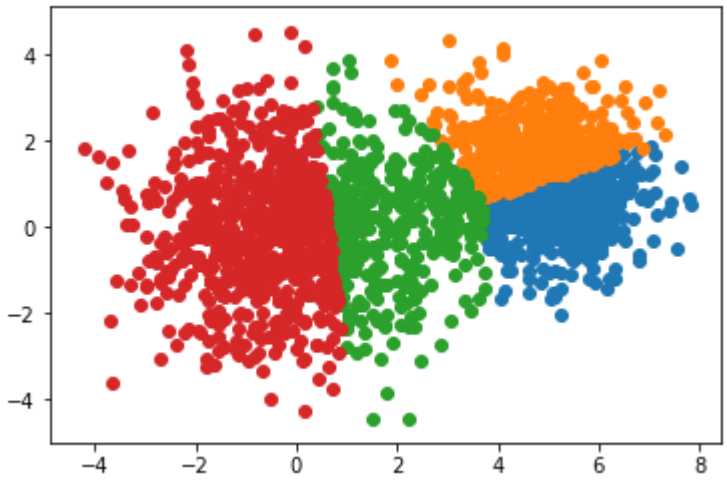
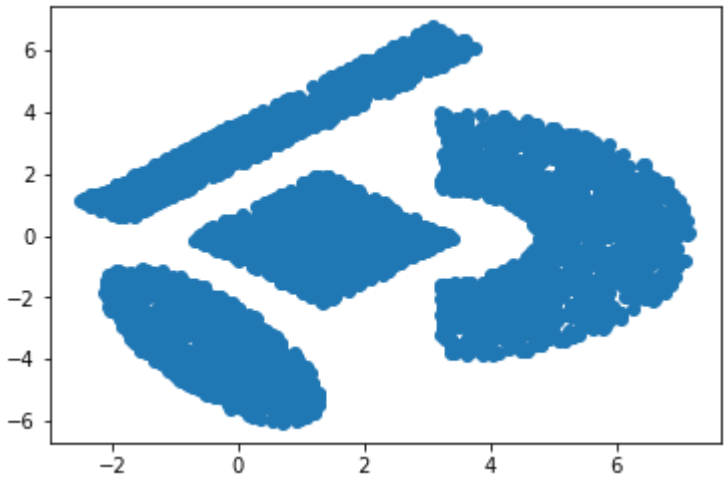

In [76]:

```
import matplotlib.pyplot as plt
plt.plot()
for i in D_C_2:
    plt.scatter(pd.DataFrame(i)[0],pd.DataFrame(i)[1])

plt.show()
```



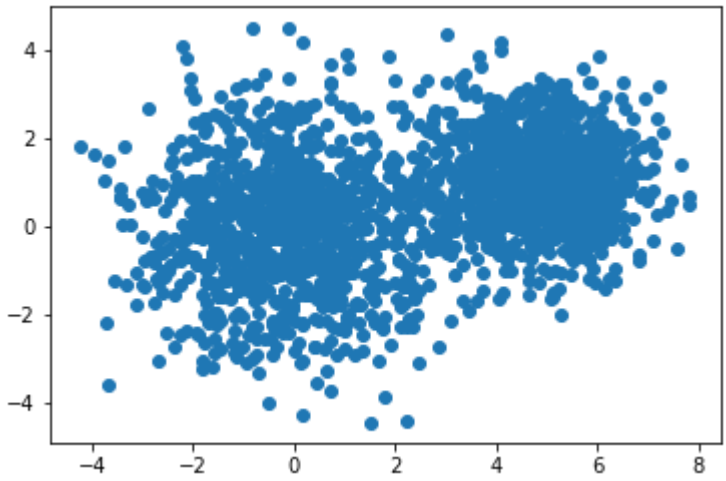
In [77]:

```
plt.scatter(data[0],data[1])
plt.show()
```




In [78]:

```
plt.scatter(data_2[0],data_2[1])
plt.show()
```



In [79]:

```
k = 7

C = random_centers(data,k)
D_C_2 = assign_data_centers(data,k,C)
tol = 1
while tol > 0.00001:

    N_C = revalaute_centres(D_C_2,k)
    D_C_1 = D_C_2
    D_C_2 = assign_data_centers(data,k,N_C)
    temp_sum = 0

    tol = tol/10
```

```
C:\Users\Karthik\Anaconda3\lib\site-packages\ipykernel_launcher.py:12: Depre
cationWarning: using a non-integer array as obj in delete will result in an
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  if sys.path[0] == '':
C:\Users\Karthik\Anaconda3\lib\site-packages\ipykernel_launcher.py:12: Futur
eWarning: in the future negative indices will not be ignored by `numpy.delet
e`.
  if sys.path[0] == '':
```
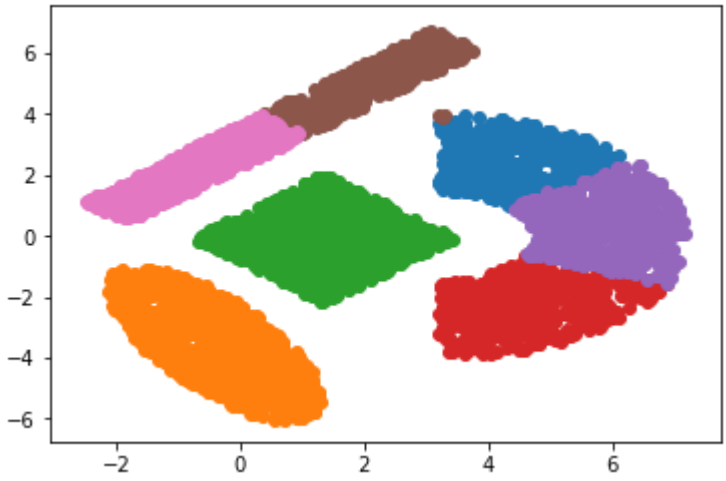

In [80]:

```
import matplotlib.pyplot as plt
plt.plot()
for i in D_C_2:
    plt.scatter(pd.DataFrame(i)[0],pd.DataFrame(i)[1])

plt.show()
```



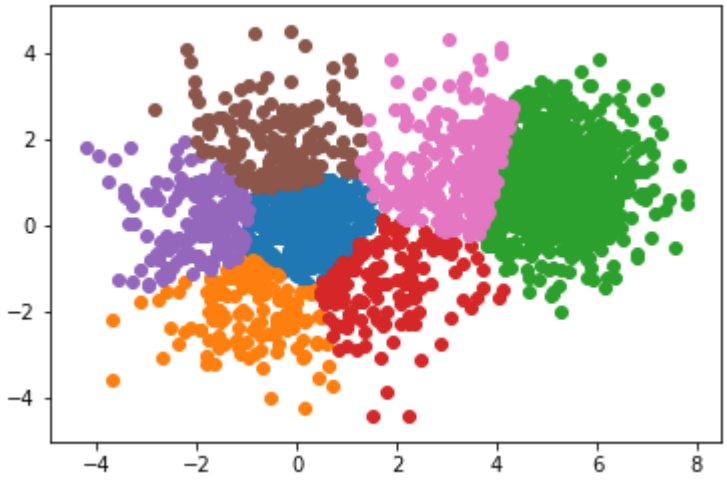
In [81]:

```
k = 7

C = random_centers(data_2,k)
D_C_2 = assign_data_centers(data_2,k,C)
tol = 1
while tol > 0.00001:

    N_C = revalaute_centres(D_C_2,k)
    D_C_1 = D_C_2
    D_C_2 = assign_data_centers(data_2,k,N_C)
    temp_sum = 0

    tol = tol/10
```

```
C:\Users\Karthik\Anaconda3\lib\site-packages\ipykernel_launcher.py:12: Depre
cationWarning: using a non-integer array as obj in delete will result in an
error in the future
  if sys.path[0] == '':
C:\Users\Karthik\Anaconda3\lib\site-packages\ipykernel_launcher.py:12: Futur
eWarning: in the future negative indices will not be ignored by `numpy.delet
e`.
  if sys.path[0] == '':
```

In [82]:

```
import matplotlib.pyplot as plt
plt.plot()
for i in D_C_2:
    plt.scatter(pd.DataFrame(i)[0],pd.DataFrame(i)[1])

plt.show()
```



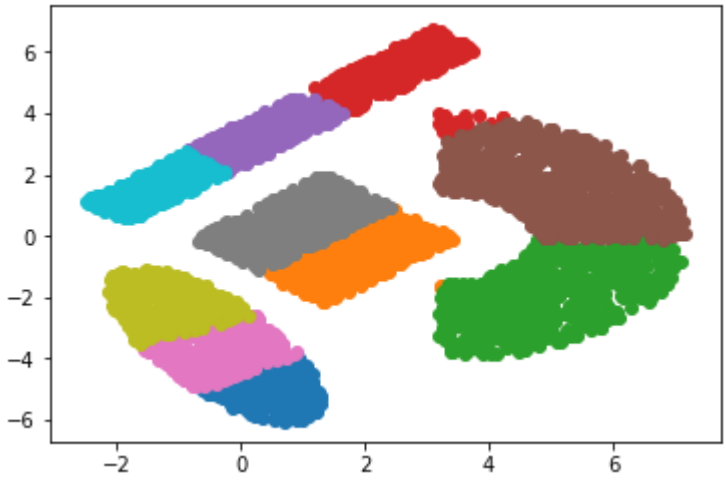
In [83]:

```
k = 10

C = random_centers(data,k)
D_C_2 = assign_data_centers(data,k,C)
tol = 1
while tol > 0.00001:

    N_C = revalaute_centres(D_C_2,k)
    D_C_1 = D_C_2
    D_C_2 = assign_data_centers(data,k,N_C)
    temp_sum = 0

    tol = tol/10
```

```
C:\Users\Karthik\Anaconda3\lib\site-packages\ipykernel_launcher.py:12: Depre
cationWarning: using a non-integer array as obj in delete will result in an
error in the future
  if sys.path[0] == '':
C:\Users\Karthik\Anaconda3\lib\site-packages\ipykernel_launcher.py:12: Futur
eWarning: in the future negative indices will not be ignored by `numpy.delet
e`.
  if sys.path[0] == '':
```

In [84]:

```
import matplotlib.pyplot as plt
plt.plot()
for i in D_C_2:
    plt.scatter(pd.DataFrame(i)[0],pd.DataFrame(i)[1])

plt.show()
```



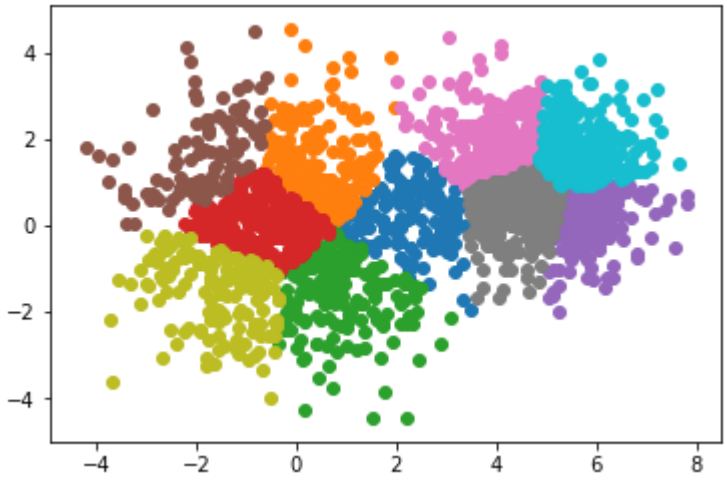
In [85]:

```
k = 10

C = random_centers(data_2,k)
D_C_2 = assign_data_centers(data_2,k,C)
tol = 1
while tol > 0.00001:

    N_C = revalaute_centres(D_C_2,k)
    D_C_1 = D_C_2
    D_C_2 = assign_data_centers(data_2,k,N_C)
    temp_sum = 0

    tol = tol/10
```

```
C:\Users\Karthik\Anaconda3\lib\site-packages\ipykernel_launcher.py:12: Depre
cationWarning: using a non-integer array as obj in delete will result in an
error in the future
  if sys.path[0] == '':
C:\Users\Karthik\Anaconda3\lib\site-packages\ipykernel_launcher.py:12: Futur
eWarning: in the future negative indices will not be ignored by `numpy.delet
e`.
  if sys.path[0] == '':
```

In [86]:

```
import matplotlib.pyplot as plt
plt.plot()
for i in D_C_2:
    plt.scatter(pd.DataFrame(i)[0],pd.DataFrame(i)[1])

plt.show()
```




In [ ]: