```
import matplotlib.pyplot as plt
from sklearn.cluster import KMeans
from sklearn.datasets.samples_generator import make_blobs
import numpy as np
```
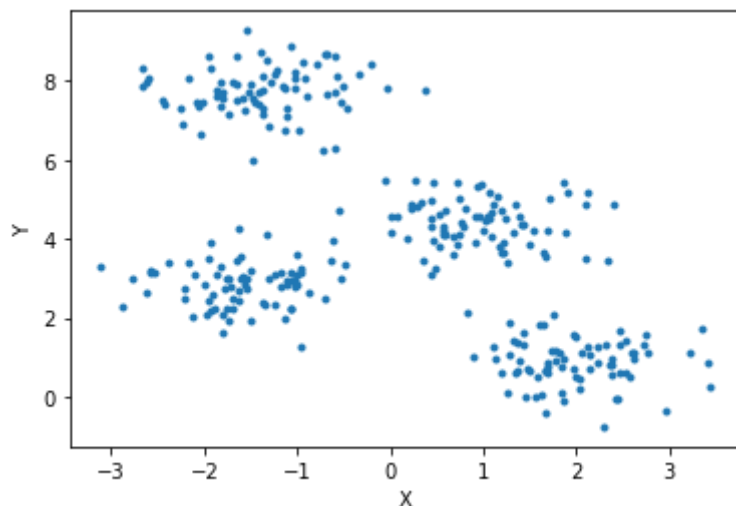
```
data, _ = make_blobs(n_samples=300, centers=4, cluster_std=0.60, random_state=0)
```

```
data.shape
```

⌟→   (300, 2)

```
plt.plot(data[:,0],data[:,1], '.')
plt.xlabel('X')
plt.ylabel('Y')
```

⌟→   Text(0, 0.5, 'Y')


```
%%time
kmeans = KMeans(n_clusters=4)
kmeans.fit(data)
```

⌟→   CPU times: user 31.6 ms, sys: 1.07 ms, total: 32.7 ms
      Wall time: 35.1 ms

```
centroids = kmeans.cluster_centers_
print(centroids)
```

⌟→   [[-1.37324398 7.75368871]
       [-1.58438467 2.83081263]
       [1.98258281 0.86771314]
       [0.94973532 4.41906906]]

```
kmeans.inertia_
```

⌟→   212.00599621083478

```
kmeans.labels_
```

```
array([2, 0, 3, 0, 2, 2, 1, 3, 0, 0, 1, 0, 3, 0, 2, 3, 3, 2, 1, 1, 2, 2,
       3, 1, 1, 3, 2, 3, 1, 3, 0, 0, 3, 0, 0, 0, 0, 0, 1, 2, 3, 1, 3, 3,
       1, 1, 0, 1, 0, 2, 1, 2, 0, 2, 2, 1, 0, 1, 0, 2, 0, 3, 0, 1, 1, 1,
       0, 2, 0, 1, 3, 1, 0, 1, 1, 0, 1, 3, 2, 0, 2, 3, 2, 2, 0, 3, 2, 3,
       0, 0, 3, 2, 0, 1, 1, 3, 2, 2, 3, 1, 0, 2, 0, 2, 3, 2, 2, 3, 0, 3,
       1, 1, 2, 0, 2, 3, 0, 2, 2, 3, 1, 2, 1, 2, 2, 2, 2, 1, 2, 1, 0, 1,
       1, 2, 0, 1, 1, 0, 3, 0, 0, 1, 3, 1, 3, 1, 0, 3, 0, 0, 0, 3, 0, 3,
       2, 1, 0, 1, 2, 3, 0, 3, 3, 2, 3, 1, 1, 3, 2, 3, 3, 0, 2, 3, 1, 0,
       2, 2, 3, 1, 2, 3, 1, 1, 3, 3, 3, 3, 2, 0, 3, 1, 3, 3, 1, 1, 1, 3,
       1, 0, 3, 1, 2, 1, 3, 0, 1, 0, 3, 0, 3, 1, 3, 3, 0, 1, 1, 2, 2, 3,
       0, 2, 2, 1, 2, 1, 3, 0, 0, 3, 3, 0, 3, 2, 1, 3, 2, 1, 0, 1, 2, 3,
       2, 0, 0, 0, 0, 1, 1, 0, 3, 1, 2, 3, 1, 1, 1, 2, 2, 0, 3, 3, 1, 2,
       0, 1, 3, 0, 3, 2, 2, 1, 1, 3, 2, 2, 2, 3, 0, 0, 2, 2, 3, 2, 2, 2,
       0, 1, 0, 3, 2, 2, 0, 0, 0, 2, 2, 3, 0, 1], dtype=int32)
```

```python
#plt.plot(x,y, '.')
plt.scatter(data[:, 0], data[:, 1],c=kmeans.labels_)
plt.plot(centroids[:,0], centroids[:, 1], 'r+')
plt.xlabel('X')
plt.ylabel('Y')
```

```
Text(0, 0.5, 'Y')
```