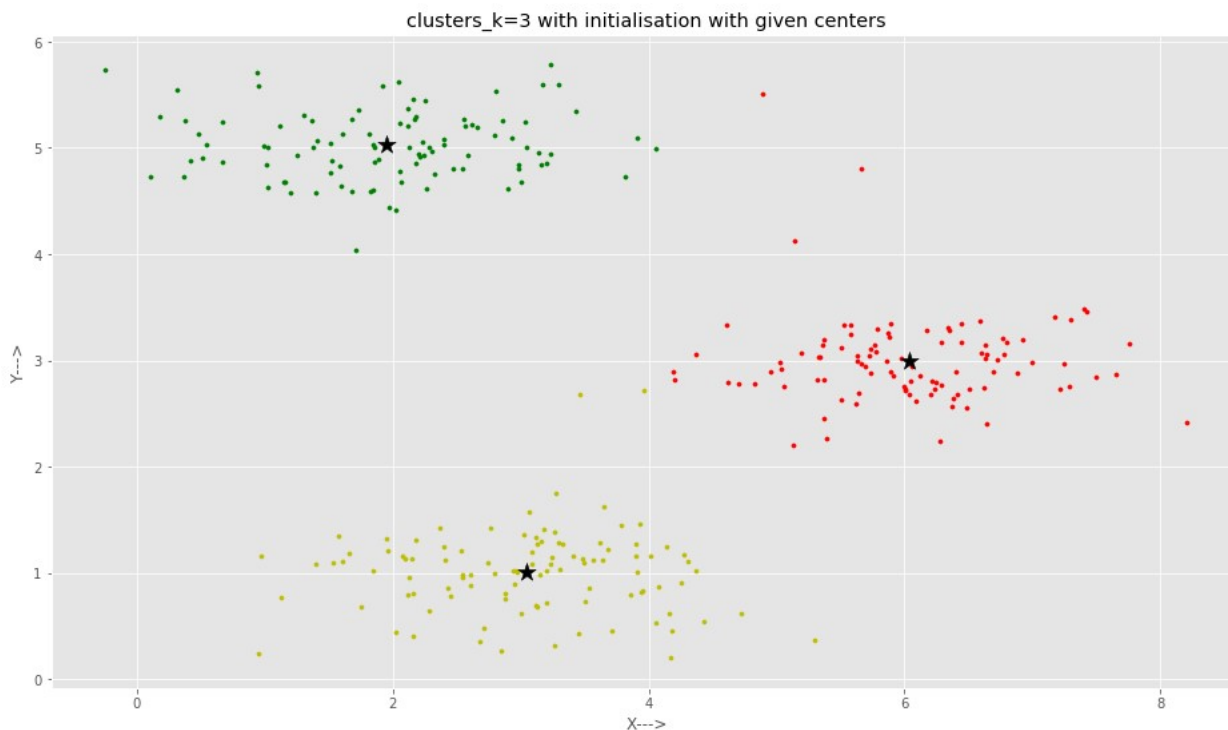


Python 3.7.3 (default, Mar 27 2019, 17:13:21) [MSC v.1915 64 bit (AMD64)]  
Type "copyright", "credits" or "license" for more information.

IPython 7.4.0 -- An enhanced Interactive Python.

```
In [1]: runfile('C:/Users/tinku/Downloads/computerassignmentonclustering_22949/assignment2/spy_code.py', wdir='C:/Users/tinku/Downloads/computerassignmentonclustering_22949/assignment2')
```



For k=3 with given initial cluster centers :

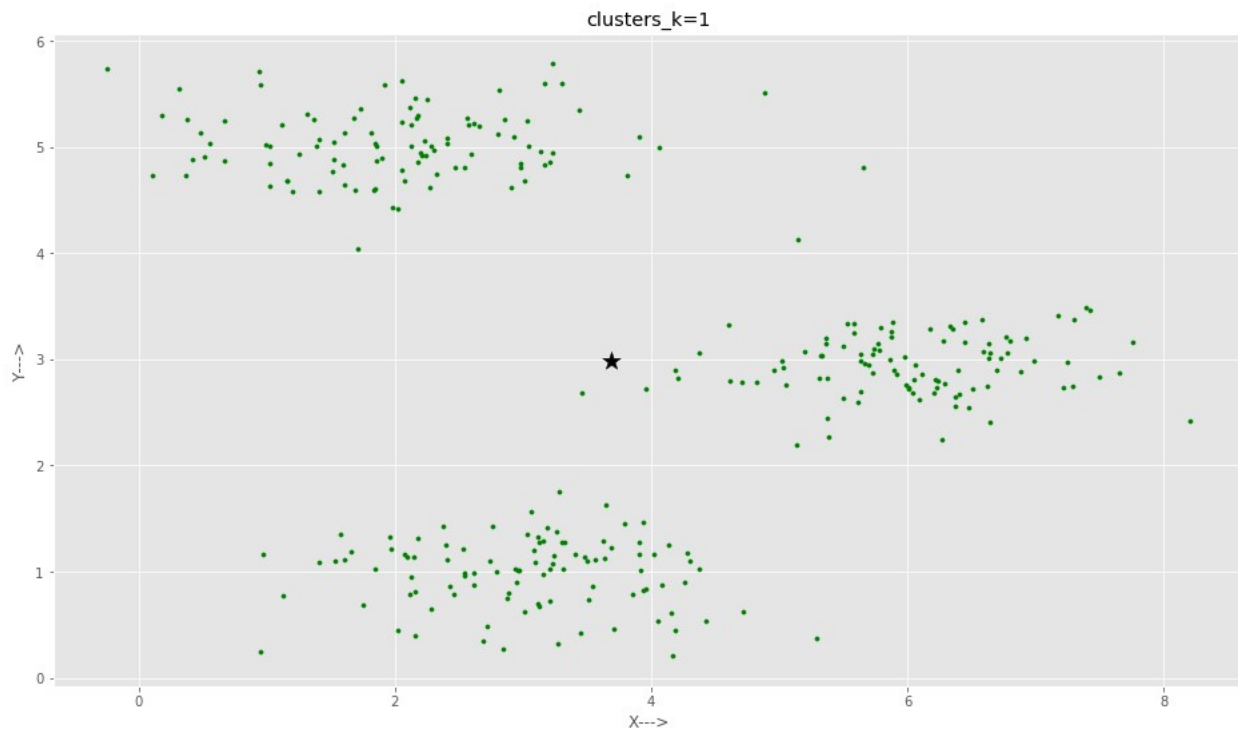
Centroids :

```
[[1.9539955 5.0255713]
```

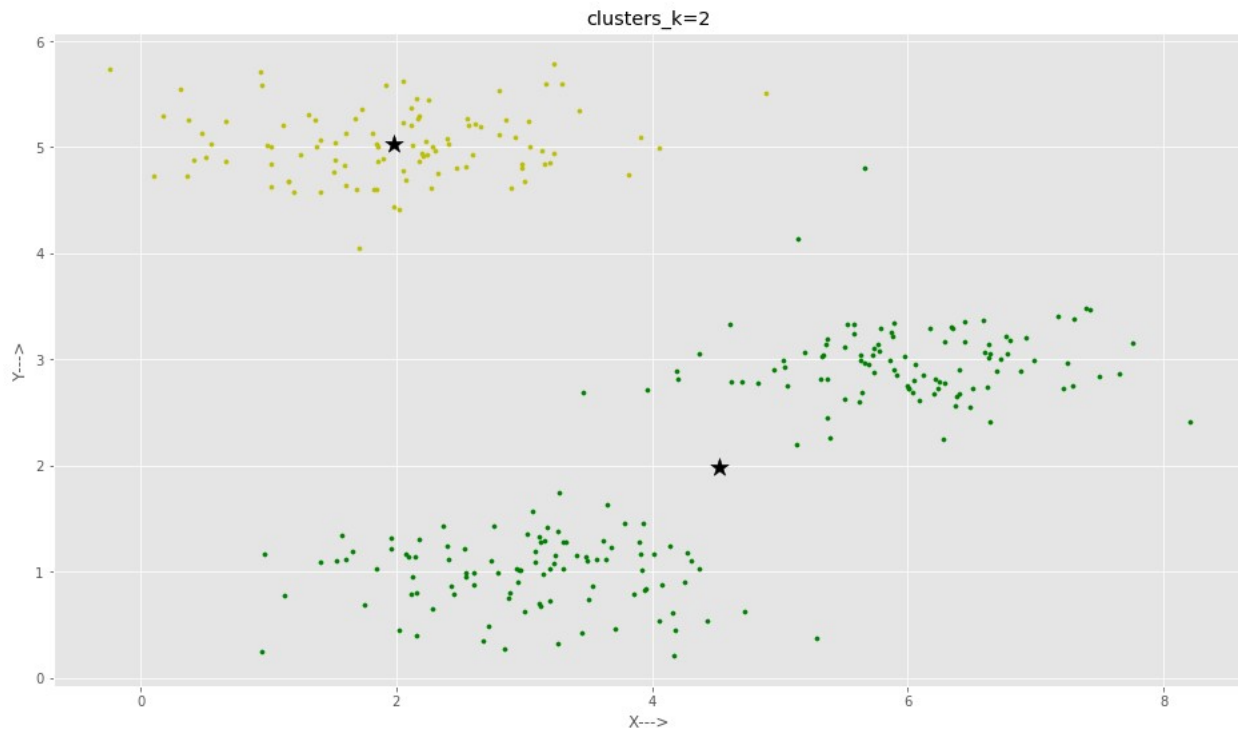
```
[3.0436718 1.0154091]
```

```
[6.033667 3.000527 ]]
```

Error : 266.6592239038661

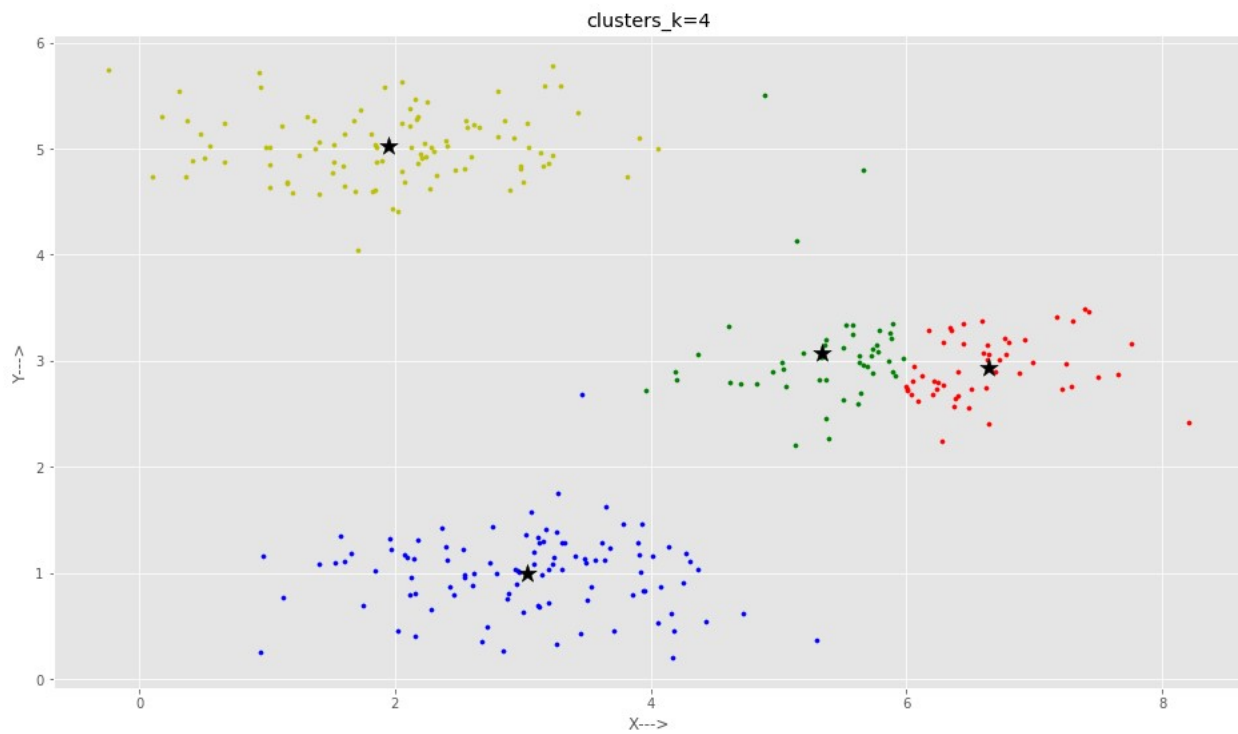


For k = 1 with random initial centers :  
 Centroids :  
 [[3.68437597 2.98710143]]  
 Error : 1957.6559762045035



For k = 2 with random initial centers :  
 Centroids :  
 [[4.52205592 1.98068522]  
 [1.98363182 5.03043131]]

Error : 913.3200986346718



For k = 4 with random initial centers :

Centroids :

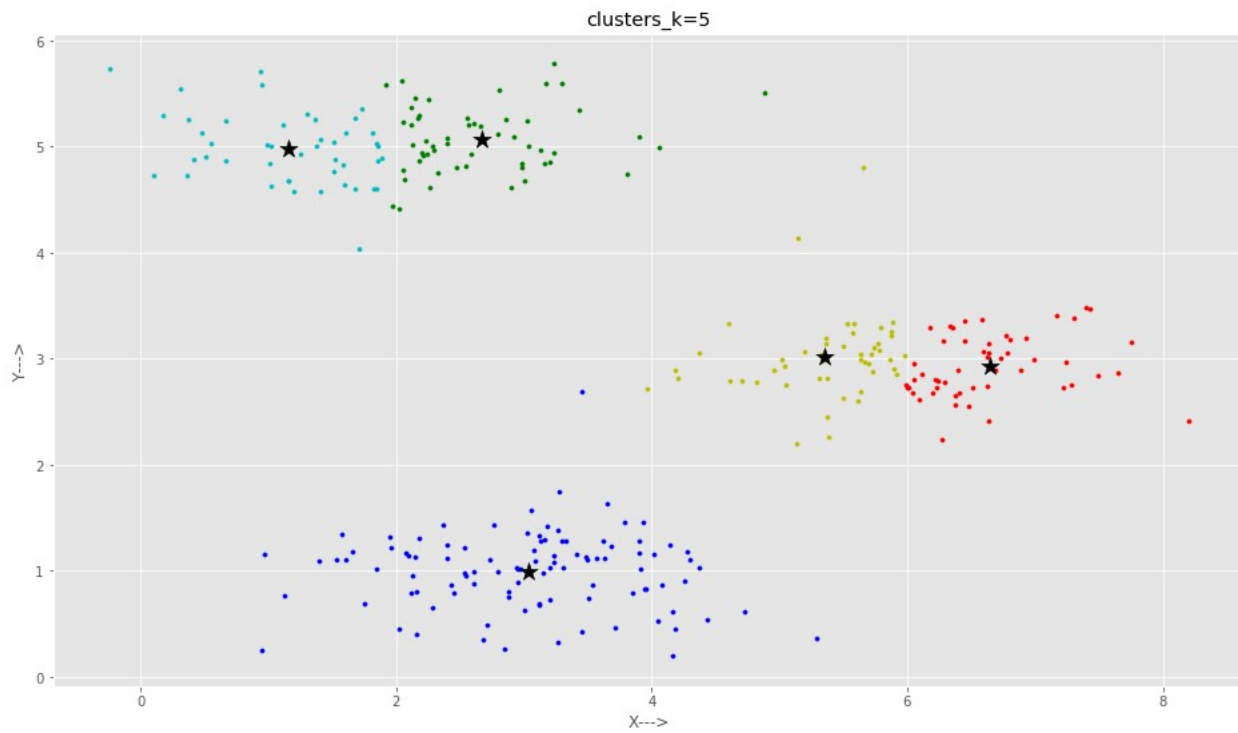
`[[5.34301224 3.06650816]`

`[1.95399541 5.02557143]`

`[6.64462885 2.93296346]`

`[3.03458356 0.99852901]]`

Error : 224.01069008074694



For k = 5 with random initial centers :

Centroids :

```
[[2.67056481 5.07124444]
```

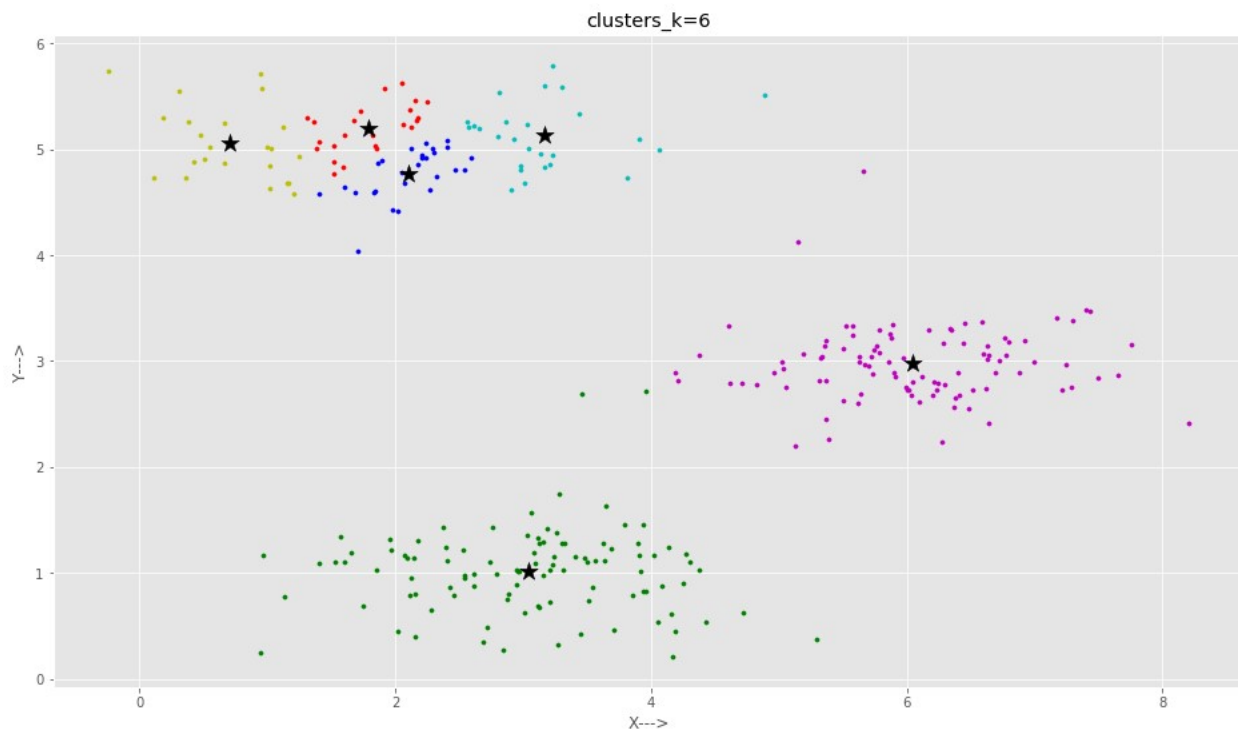
```
[5.35249167 3.01567083]
```

```
[6.64462885 2.93296346]
```

```
[3.03458356 0.99852901]
```

```
[1.15931222 4.98145556]]
```

Error : 170.2144604601292

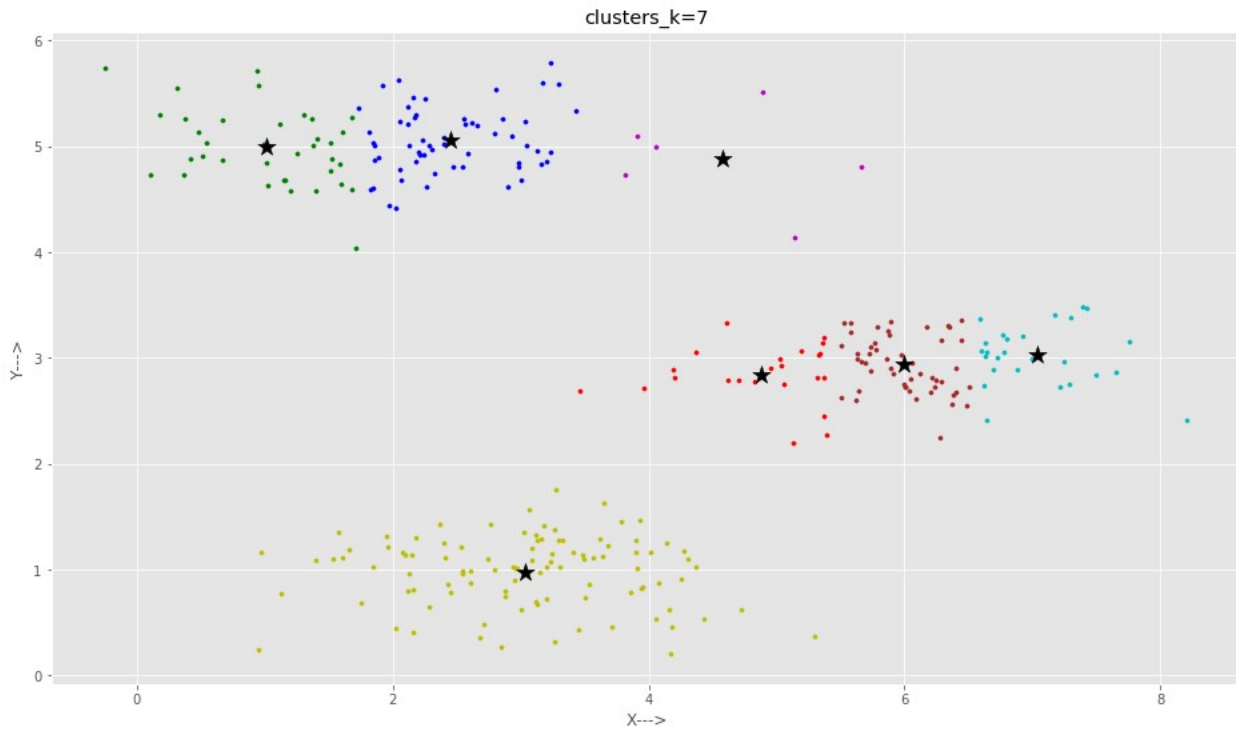


For k = 6 with random initial centers :

Centroids :

```
[[3.04367196 1.01540912]
 [0.70487609 5.05449565]
 [1.78928696 5.19947391]
 [2.1010963  4.77196296]
 [3.16477692 5.12801538]
 [6.04523939 2.97521212]]
```

Error : 189.89381868898704

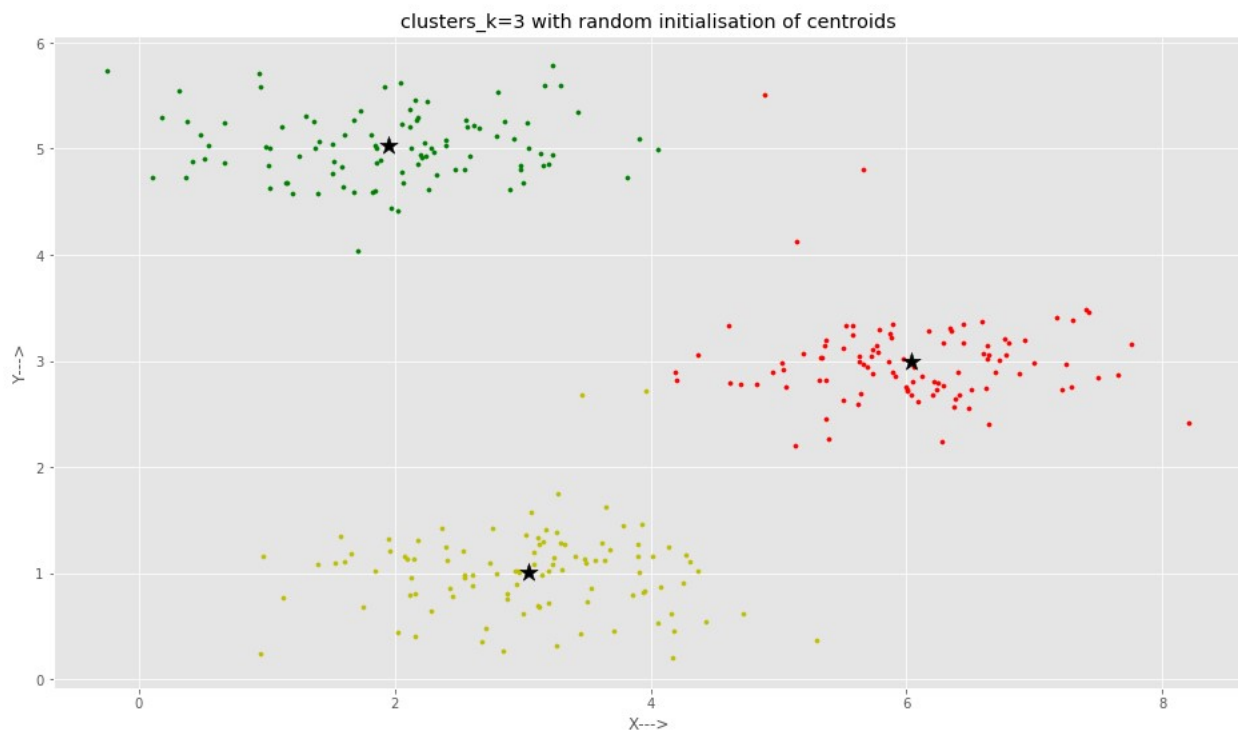


For k = 7 with random initial centers :

Centroids :

```
[[1.01359054 4.99104595]
 [3.0303364  0.9816663 ]
 [4.8773913  2.8460087 ]
 [2.45182759 5.05193793]
 [7.04212692 3.02765   ]
 [4.5791     4.87731667]
 [5.996408   2.936834  ]]
```

Error : 144.7806805453388



For k = 3 with random initial centers :

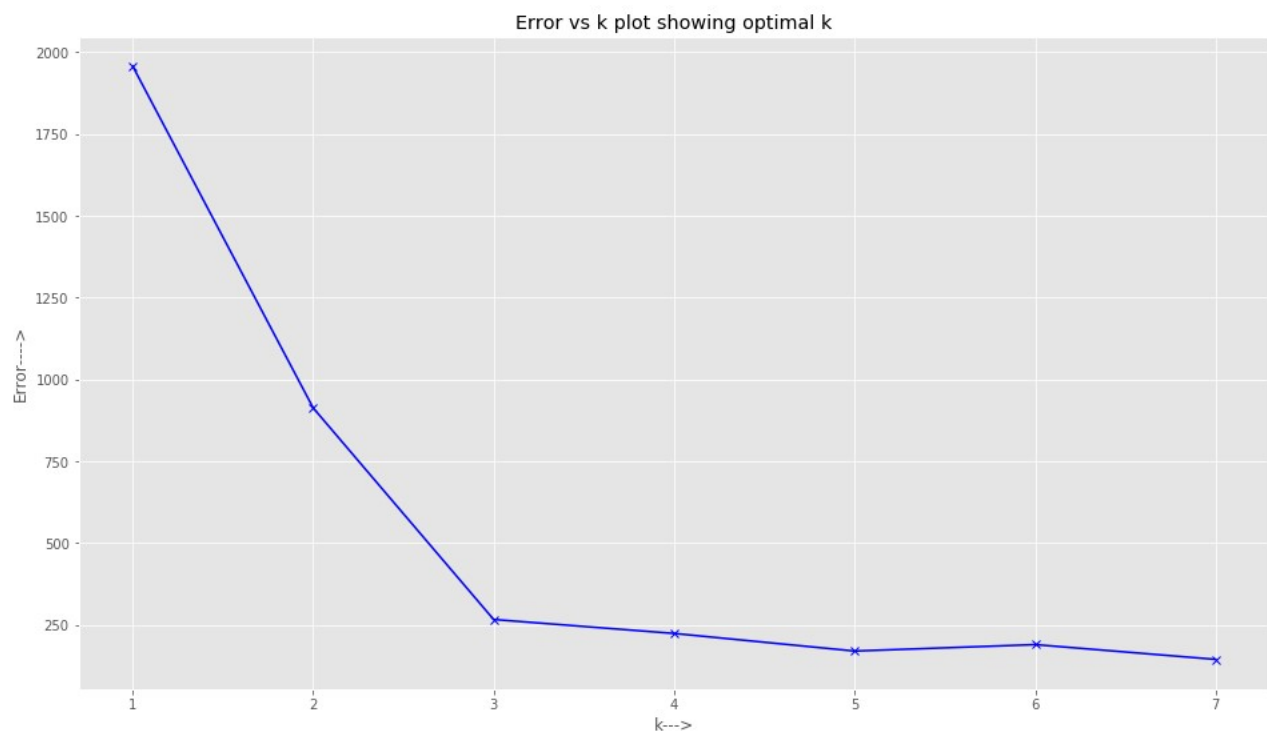
Centroids :

```
[[1.95399541 5.02557143]
```

```
[3.04367196 1.01540912]
```

```
[6.033667 3.000527  ]]
```

Error : 266.6592239038621



In [2]: