Exercise16SutowBrett

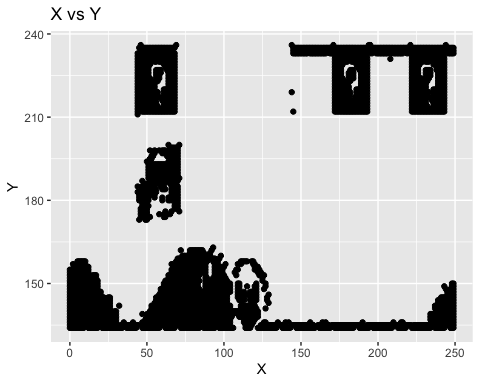
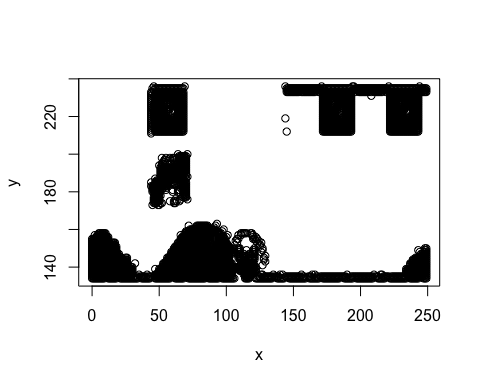
Brett Sutow

10/30/2020

## x y  
## 1 46 236  
## 2 69 236  
## 3 144 236  
## 4 171 236  
## 5 194 236  
## 6 195 236

## Answer 1

1. Below are the scatter plots



## Answer 2

1. Below are the k-means results as well as the scatter plots created:

## Loading required package: colorspace

## Loading required package: grid

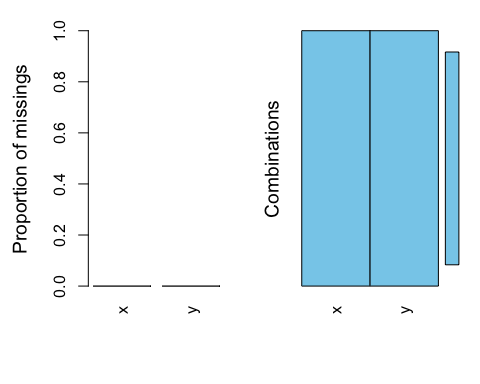
## VIM is ready to use.

## Suggestions and bug-reports can be submitted at: https://github.com/statistikat/VIM/issues

##   
## Attaching package: 'VIM'

## The following object is masked from 'package:datasets':  
##   
## sleep

## Welcome! Want to learn more? See two factoextra-related books at https://goo.gl/ve3WBa



## K-means clustering with 2 clusters of sizes 1308, 2714  
##   
## Cluster means:  
## x y  
## 1 207.8005 203.2898  
## 2 62.2815 162.4090  
##   
## Clustering vector:  
## [1] 2 2 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 1 1 1 1 1 1  
## [38] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [75] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [112] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [149] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [186] 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 1 1 1 1 1 1 1  
## [223] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [260] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [297] 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 1 1 1 1 1  
## [334] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [371] 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [408] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2 2  
## [445] 2 2 2 2 2 2 2 2 2 2 2 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [482] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 1 1 1 1 1 1 1 1  
## [519] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 1 1 1 1  
## [556] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 1  
## [593] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2  
## [630] 2 2 2 2 2 2 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 2  
## [667] 2 2 2 2 2 2 2 2 2 2 2 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [704] 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [741] 1 1 1 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 1 1 1 1 1 1 1 1 1  
## [778] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 1 1  
## [815] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2 2  
## [852] 2 2 2 2 2 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2  
## [889] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [926] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [963] 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [1000] 1 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [1037] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2  
## [1074] 2 2 2 2 2 2 2 2 2 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [1111] 1 1 1 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 1 1 1 1 1  
## [1148] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 2 2  
## [1185] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [1222] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 1 1  
## [1259] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 2 2 2 2  
## [1296] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [1333] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2  
## [1370] 2 2 2 2 2 2 2 2 2 2 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [1407] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [1444] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [1481] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [1518] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [1555] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [1592] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [1629] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [1666] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [1703] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [1740] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [1777] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [1814] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [1851] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [1888] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [1925] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [1962] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [1999] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [2036] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [2073] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [2110] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [2147] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [2184] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [2221] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [2258] 2 2 2 2 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [2295] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 1 1 1  
## [2332] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [2369] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 1 1 1 1 2 2 2  
## [2406] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [2443] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 1 1 1  
## [2480] 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [2517] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [2554] 2 2 1 1 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [2591] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [2628] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [2665] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [2702] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 1 1 1 1  
## [2739] 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [2776] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [2813] 2 2 2 2 2 2 2 2 1 1 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [2850] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [2887] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 1 1  
## [2924] 1 1 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [2961] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [2998] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 1 1 1 1 1 1 1 1 1  
## [3035] 1 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [3072] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [3109] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 1 1 1 1 1 1  
## [3146] 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [3183] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [3220] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 1 1  
## [3257] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [3294] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [3331] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [3368] 2 2 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [3405] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [3442] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [3479] 2 2 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [3516] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [3553] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [3590] 2 2 2 2 2 2 2 2 2 2 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 2 2 2  
## [3627] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [3664] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [3701] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [3738] 2 2 2 2 2 2 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [3775] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [3812] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [3849] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [3886] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [3923] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [3960] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [3997] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
##   
## Within cluster sum of squares by cluster:  
## [1] 3057964 5385717  
## (between\_SS / total\_SS = 70.5 %)  
##   
## Available components:  
##   
## [1] "cluster" "centers" "totss" "withinss" "tot.withinss"  
## [6] "betweenss" "size" "iter" "ifault"

## K-means clustering with 3 clusters of sizes 2696, 985, 341  
##   
## Cluster means:  
## x y  
## 1 61.74629 162.5942  
## 2 203.98579 224.8406  
## 3 215.36950 137.4164  
##   
## Clustering vector:  
## [1] 1 1 2 2 2 2 2 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2  
## [38] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [75] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [112] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [149] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [186] 2 2 2 2 2 2 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2  
## [223] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [260] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [297] 2 2 2 2 2 2 2 2 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 2 2 2 2  
## [334] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [371] 2 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [408] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 1 1 1 1 1 1 1 1 1 1  
## [445] 1 1 1 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [482] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2  
## [519] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 1 1 1 1 1 1 1 1 1 1 1 1 1 2 2 2 2  
## [556] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2  
## [593] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 1 1 1 1 1 1 1 1 1  
## [630] 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 1 1  
## [667] 1 1 1 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [704] 2 2 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [741] 2 2 2 2 2 2 2 2 2 2 2 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2  
## [778] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 2  
## [815] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 1 1 1 1 1 1 1 1 1 1  
## [852] 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 1  
## [889] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [926] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [963] 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [1000] 2 2 2 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [1037] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 1 1 1 1 1 1 1 1 1 1 1 1  
## [1074] 1 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [1111] 2 2 2 2 2 2 2 2 2 2 2 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 2 2 2 2  
## [1148] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 1 1 1  
## [1185] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [1222] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 2  
## [1259] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 1 1 1 1 1  
## [1296] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [1333] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 1 1 1 1 1 1 1 1 1 1 1 1  
## [1370] 1 1 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [1407] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [1444] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [1481] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [1518] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [1555] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [1592] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [1629] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [1666] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [1703] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [1740] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [1777] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [1814] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [1851] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [1888] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [1925] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [1962] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [1999] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [2036] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [2073] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [2110] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [2147] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [2184] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [2221] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [2258] 1 1 1 1 3 3 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [2295] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 3 3 3  
## [2332] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [2369] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 3 3 3 3 1 1 1  
## [2406] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [2443] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 3 3 3  
## [2480] 3 3 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [2517] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [2554] 1 1 3 3 3 3 3 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [2591] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [2628] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 3 3 3 3 3 3 3 3 3 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [2665] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [2702] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 3 3 3 3  
## [2739] 3 3 3 3 3 3 3 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [2776] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [2813] 1 1 1 1 1 1 1 1 3 3 3 3 3 3 3 3 3 3 3 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [2850] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [2887] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 3 3  
## [2924] 3 3 3 3 3 3 3 3 3 3 3 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [2961] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [2998] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 3 3 3 3 3 3 3 3 3  
## [3035] 3 3 3 3 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [3072] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [3109] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 3 3 3 3 3 3  
## [3146] 3 3 3 3 3 3 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [3183] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [3220] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 3 3  
## [3257] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [3294] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [3331] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [3368] 1 1 1 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [3405] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [3442] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [3479] 1 1 1 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [3516] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [3553] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [3590] 1 1 1 1 1 1 1 1 1 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 1 1 1 1  
## [3627] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [3664] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [3701] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 3  
## [3738] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [3775] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [3812] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [3849] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [3886] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [3923] 1 1 1 1 1 1 1 1 1 1 1 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [3960] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [3997] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
##   
## Within cluster sum of squares by cluster:  
## [1] 5255088.5 831375.8 417436.3  
## (between\_SS / total\_SS = 77.3 %)  
##   
## Available components:  
##   
## [1] "cluster" "centers" "totss" "withinss" "tot.withinss"  
## [6] "betweenss" "size" "iter" "ifault"

## K-means clustering with 4 clusters of sizes 313, 985, 1379, 1345  
##   
## Cluster means:  
## x y  
## 1 221.61981 137.6677  
## 2 203.98579 224.8406  
## 3 85.89630 144.5330  
## 4 38.72937 180.5294  
##   
## Clustering vector:  
## [1] 4 4 2 2 2 2 2 2 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 2 2 2 2 2 2  
## [38] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [75] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [112] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 4 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [149] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [186] 2 2 2 2 2 2 2 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 2 2 2 2 2 2 2  
## [223] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [260] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [297] 2 2 2 2 2 2 2 2 2 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 2 2 2 2 2  
## [334] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [371] 2 2 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [408] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 4 4 4 4 4 4 4 4 4 4  
## [445] 4 4 4 4 4 4 4 4 4 4 4 4 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [482] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 2 2 2 2 2 2 2 2  
## [519] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 4 4 4 4 4 4 4 4 4 4 4 4 4 2 2 2 2  
## [556] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 2  
## [593] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 4 4 4 4 4 4 4 4 4  
## [630] 4 4 4 4 4 4 4 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 4 4  
## [667] 4 4 4 4 4 4 4 4 4 4 4 4 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [704] 2 2 2 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [741] 2 2 2 2 2 2 2 2 2 2 2 2 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 2 2 2 2 2 2 2 2 2  
## [778] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 2 2  
## [815] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 4 4 4 4 4 4 4 4 4 4  
## [852] 4 4 4 4 4 4 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 4  
## [889] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [926] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [963] 4 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [1000] 2 2 2 2 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [1037] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 4 4 4 4 4 4 4 4 4 4 4 4  
## [1074] 4 4 4 4 4 4 4 4 4 4 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [1111] 2 2 2 2 2 2 2 2 2 2 2 2 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 2 2 2 2 2  
## [1148] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 4 4 4  
## [1185] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [1222] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 2 2  
## [1259] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 4 4 4 4 4  
## [1296] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [1333] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 4 4 4 4 4 4 4 4 4 4 4 4  
## [1370] 4 4 4 4 4 4 4 4 4 4 4 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [1407] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [1444] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [1481] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [1518] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [1555] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [1592] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [1629] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [1666] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [1703] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [1740] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 3 3 3 3 3 3 3 3 3  
## [1777] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [1814] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 4 4 4 4 4 4 3 3 3 3 3 3 3 3 3  
## [1851] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 4 4 4 4 4 4 4 4 3 3 3 3 3 3  
## [1888] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 4 4 4 4 4 4 4 4 4 4 3 3 3 3  
## [1925] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 4 4 4 4 4 4 4 4 4 4 4  
## [1962] 4 4 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 4  
## [1999] 4 4 4 4 4 4 4 4 4 4 4 4 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [2036] 3 3 3 3 3 3 3 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [2073] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [2110] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 4 4 4 4 4  
## [2147] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [2184] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 3 3 3  
## [2221] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [2258] 3 3 3 3 1 1 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 3 3 3 3 3 3 3 3 3 3 3 3  
## [2295] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 1 1 1  
## [2332] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [2369] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 1 1 1 1 4 4 4  
## [2406] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [2443] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 1 1 1  
## [2480] 1 1 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [2517] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [2554] 3 3 1 1 1 1 1 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 3 3 3 3 3 3  
## [2591] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [2628] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 1 1 1 1 1 1 1 1 1 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [2665] 4 4 4 4 4 4 4 4 4 4 4 4 4 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [2702] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 1 1 1 1  
## [2739] 1 1 1 1 1 1 1 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 3 3 3 3  
## [2776] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [2813] 3 3 3 3 3 3 3 3 1 1 1 1 1 1 1 1 1 1 1 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [2850] 4 4 4 4 4 4 4 4 4 4 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [2887] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 1 1  
## [2924] 1 1 1 1 1 1 1 1 1 1 1 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [2961] 4 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [2998] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 1 1 1 1 1 1 1 1 1  
## [3035] 1 1 1 1 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 3 3 3  
## [3072] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [3109] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 1 1 1 1 1 1  
## [3146] 1 1 1 1 1 1 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [3183] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [3220] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 1 1  
## [3257] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [3294] 4 4 4 4 4 4 4 4 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [3331] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [3368] 3 3 3 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [3405] 4 4 4 4 4 4 4 4 4 4 4 4 4 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [3442] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [3479] 3 3 3 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [3516] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [3553] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [3590] 3 3 3 3 3 3 3 3 3 3 3 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 4 4 4 4  
## [3627] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 3 3 3  
## [3664] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [3701] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [3738] 3 3 3 3 3 3 3 3 3 3 3 3 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [3775] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [3812] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [3849] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [3886] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [3923] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [3960] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [3997] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
##   
## Within cluster sum of squares by cluster:  
## [1] 267545.2 831375.8 678507.4 2396354.6  
## (between\_SS / total\_SS = 85.4 %)  
##   
## Available components:  
##   
## [1] "cluster" "centers" "totss" "withinss" "tot.withinss"  
## [6] "betweenss" "size" "iter" "ifault"

## K-means clustering with 5 clusters of sizes 586, 1356, 313, 782, 985  
##   
## Cluster means:  
## x y  
## 1 14.10580 143.0324  
## 2 86.55457 144.6858  
## 3 221.61981 137.6677  
## 4 57.42711 207.3043  
## 5 203.98579 224.8406  
##   
## Clustering vector:  
## [1] 4 4 5 5 5 5 5 5 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 5 5 5 5 5 5  
## [38] 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5  
## [75] 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5  
## [112] 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5  
## [149] 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5  
## [186] 5 5 5 5 5 5 5 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 5 5 5 5 5 5 5  
## [223] 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5  
## [260] 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5  
## [297] 5 5 5 5 5 5 5 5 5 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 5 5 5 5 5  
## [334] 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5  
## [371] 5 5 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5  
## [408] 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 4 4 4 4 4 4 4 4 4 4  
## [445] 4 4 4 4 4 4 4 4 4 4 4 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5  
## [482] 5 5 5 5 5 5 5 5 5 5 5 5 5 5 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 5 5 5 5 5 5 5 5  
## [519] 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 4 4 4 4 4 4 4 4 4 4 4 4 4 5 5 5 5  
## [556] 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 5  
## [593] 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 4 4 4 4 4 4 4 4 4  
## [630] 4 4 4 4 4 4 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 4 4  
## [667] 4 4 4 4 4 4 4 4 4 4 4 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5  
## [704] 5 5 5 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5  
## [741] 5 5 5 5 5 5 5 5 5 5 5 5 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 5 5 5 5 5 5 5 5 5  
## [778] 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 5 5  
## [815] 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 4 4 4 4 4 4 4 4 4 4  
## [852] 4 4 4 4 4 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 4  
## [889] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5  
## [926] 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [963] 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5  
## [1000] 5 5 5 5 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 5 5 5 5 5 5 5 5 5 5 5 5 5  
## [1037] 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 4 4 4 4 4 4 4 4 4 4 4 4  
## [1074] 4 4 4 4 4 4 4 4 4 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5  
## [1111] 5 5 5 5 5 5 5 5 5 5 5 5 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 5 5 5 5 5  
## [1148] 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 4 4 4  
## [1185] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5  
## [1222] 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 5 5  
## [1259] 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 4 4 4 4 4  
## [1296] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5  
## [1333] 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 4 4 4 4 4 4 4 4 4 4 4 4  
## [1370] 4 4 4 4 4 4 4 4 4 4 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5  
## [1407] 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [1444] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [1481] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [1518] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [1555] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [1592] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [1629] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [1666] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [1703] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [1740] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 2 2 2 2 2 2 2 2 2  
## [1777] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [1814] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2  
## [1851] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 1 1 1 1 1 1 1 1 2 2 2 2 2 2  
## [1888] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 1 1 1 1 1 1 1 1 1 1 2 2 2 2  
## [1925] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 1 1 1 1 1 1 1 1 1 1 1  
## [1962] 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 1  
## [1999] 1 1 1 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [2036] 2 2 2 2 2 2 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [2073] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [2110] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 1 1 1 1 1  
## [2147] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [2184] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 2 2  
## [2221] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [2258] 2 2 2 2 3 3 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2  
## [2295] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 3 3 3  
## [2332] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [2369] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 3 3 3 3 1 1 1  
## [2406] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [2443] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 3 3 3  
## [2480] 3 3 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [2517] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [2554] 2 2 3 3 3 3 3 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2  
## [2591] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [2628] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 3 3 3 3 3 3 3 3 3 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [2665] 1 1 1 1 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [2702] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 3 3 3 3  
## [2739] 3 3 3 3 3 3 3 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 2 2 2  
## [2776] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [2813] 2 2 2 2 2 2 2 2 3 3 3 3 3 3 3 3 3 3 3 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [2850] 1 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [2887] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 3 3  
## [2924] 3 3 3 3 3 3 3 3 3 3 3 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [2961] 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [2998] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 3 3 3 3 3 3 3 3 3  
## [3035] 3 3 3 3 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 2 2  
## [3072] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [3109] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 3 3 3 3 3 3  
## [3146] 3 3 3 3 3 3 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [3183] 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [3220] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 3 3  
## [3257] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [3294] 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [3331] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [3368] 2 2 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [3405] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [3442] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [3479] 2 2 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [3516] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [3553] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [3590] 2 2 2 2 2 2 2 2 2 2 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 1 1 1 1  
## [3627] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [3664] 1 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [3701] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [3738] 2 2 2 2 2 2 2 2 2 2 2 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [3775] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [3812] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [3849] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [3886] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [3923] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [3960] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [3997] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
##   
## Within cluster sum of squares by cluster:  
## [1] 97541.82 641125.13 267545.20 334024.91 831375.78  
## (between\_SS / total\_SS = 92.4 %)  
##   
## Available components:  
##   
## [1] "cluster" "centers" "totss" "withinss" "tot.withinss"  
## [6] "betweenss" "size" "iter" "ifault"

## K-means clustering with 6 clusters of sizes 341, 1356, 586, 985, 441, 313  
##   
## Cluster means:  
## x y  
## 1 58.82698 186.9824  
## 2 86.55457 144.6858  
## 3 14.10580 143.0324  
## 4 203.98579 224.8406  
## 5 56.34467 223.0181  
## 6 221.61981 137.6677  
##   
## Clustering vector:  
## [1] 5 5 4 4 4 4 4 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 4 4 4 4 4 4  
## [38] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [75] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [112] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 5 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [149] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [186] 4 4 4 4 4 4 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 4 4 4 4 4 4 4  
## [223] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [260] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [297] 4 4 4 4 4 4 4 4 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 4 4 4 4 4  
## [334] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [371] 4 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 4 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [408] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 5 5 5 5 5 5 5 5 5 5  
## [445] 5 5 5 5 5 5 5 5 5 5 5 5 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [482] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 4 4 4 4 4 4 4 4  
## [519] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 5 5 5 5 5 5 5 5 5 5 5 5 5 4 4 4 4  
## [556] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 4  
## [593] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 5 5 5 5 5 5 5 5 5  
## [630] 5 5 5 5 5 5 5 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 5 5  
## [667] 5 5 5 5 5 5 5 5 5 5 5 5 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [704] 4 4 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [741] 4 4 4 4 4 4 4 4 4 4 4 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 4 4 4 4 4 4 4 4 4  
## [778] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 4 4  
## [815] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 5 5 5 5 5 5 5 5 5 5  
## [852] 5 5 5 5 5 5 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 5  
## [889] 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [926] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5  
## [963] 5 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [1000] 4 4 4 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [1037] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 5 5 5 5 5 5 5 5 5 5 5 5  
## [1074] 5 5 5 5 5 5 5 5 5 5 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [1111] 4 4 4 4 4 4 4 4 4 4 4 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 4 4 4 4 4  
## [1148] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 5 5 5  
## [1185] 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [1222] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 4 4  
## [1259] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 5 5 5 5 5  
## [1296] 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [1333] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 5 5 5 5 5 5 5 5 5 5 5 5  
## [1370] 5 5 5 5 5 5 5 5 5 5 5 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [1407] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 5 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [1444] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [1481] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [1518] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [1555] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [1592] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [1629] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [1666] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [1703] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [1740] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2  
## [1777] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [1814] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 3 3 3 3 3 3 2 2 2 2 2 2 2 2 2  
## [1851] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 3 3 3 3 3 3 3 3 2 2 2 2 2 2  
## [1888] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 3 3 3 3 3 3 3 3 3 3 2 2 2 2  
## [1925] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 3 3 3 3 3 3 3 3 3 3 3  
## [1962] 3 3 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 3  
## [1999] 3 3 3 3 3 3 3 3 3 3 3 3 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [2036] 2 2 2 2 2 2 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [2073] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [2110] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 3 3 3 3 3  
## [2147] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [2184] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 2 2 2  
## [2221] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [2258] 2 2 2 2 6 6 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 2 2 2 2 2 2 2 2 2 2 2 2  
## [2295] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 6 6 6  
## [2332] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [2369] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 6 6 6 6 3 3 3  
## [2406] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [2443] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 6 6 6  
## [2480] 6 6 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [2517] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [2554] 2 2 6 6 6 6 6 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 2 2 2 2 2 2  
## [2591] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [2628] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 6 6 6 6 6 6 6 6 6 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [2665] 3 3 3 3 3 3 3 3 3 3 3 3 3 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [2702] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 6 6 6 6  
## [2739] 6 6 6 6 6 6 6 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 2 2 2 2  
## [2776] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [2813] 2 2 2 2 2 2 2 2 6 6 6 6 6 6 6 6 6 6 6 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [2850] 3 3 3 3 3 3 3 3 3 3 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [2887] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 6 6  
## [2924] 6 6 6 6 6 6 6 6 6 6 6 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [2961] 3 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [2998] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 6 6 6 6 6 6 6 6 6  
## [3035] 6 6 6 6 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 2 2 2  
## [3072] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [3109] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 6 6 6 6 6 6  
## [3146] 6 6 6 6 6 6 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [3183] 3 3 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [3220] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 6 6  
## [3257] 6 6 6 6 6 6 6 6 6 6 6 6 6 6 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [3294] 3 3 3 3 3 3 3 3 3 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [3331] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [3368] 2 2 2 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [3405] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [3442] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [3479] 2 2 2 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [3516] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [3553] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [3590] 2 2 2 2 2 2 2 2 2 2 2 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 3 3 3 3  
## [3627] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [3664] 3 3 3 3 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [3701] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [3738] 2 2 2 2 2 2 2 2 2 2 2 2 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6  
## [3775] 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6  
## [3812] 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [3849] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [3886] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [3923] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 6 6 6 6 6 6 6 6 6 6 6 6 6  
## [3960] 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6  
## [3997] 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6  
##   
## Within cluster sum of squares by cluster:  
## [1] 35774.69 641125.13 97541.82 831375.78 47345.46 267545.20  
## (between\_SS / total\_SS = 93.3 %)  
##   
## Available components:  
##   
## [1] "cluster" "centers" "totss" "withinss" "tot.withinss"  
## [6] "betweenss" "size" "iter" "ifault"

## K-means clustering with 7 clusters of sizes 566, 115, 985, 810, 762, 558, 226  
##   
## Cluster means:  
## x y  
## 1 12.91166 143.2915  
## 2 171.17391 134.5739  
## 3 203.98579 224.8406  
## 4 71.36420 146.2494  
## 5 57.29790 208.1391  
## 6 103.39427 143.7043  
## 7 237.85841 138.8628  
##   
## Clustering vector:  
## [1] 5 5 3 3 3 3 3 3 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 3 3 3 3 3 3  
## [38] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [75] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [112] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 5 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [149] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [186] 3 3 3 3 3 3 3 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 3 3 3 3 3 3 3  
## [223] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [260] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [297] 3 3 3 3 3 3 3 3 3 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 3 3 3 3 3  
## [334] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [371] 3 3 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [408] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 5 5 5 5 5 5 5 5 5 5  
## [445] 5 5 5 5 5 5 5 5 5 5 5 5 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [482] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 3 3 3 3 3 3 3 3  
## [519] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 5 5 5 5 5 5 5 5 5 5 5 5 5 3 3 3 3  
## [556] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 3  
## [593] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 5 5 5 5 5 5 5 5 5  
## [630] 5 5 5 5 5 5 5 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 5 5  
## [667] 5 5 5 5 5 5 5 5 5 5 5 5 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [704] 3 3 3 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [741] 3 3 3 3 3 3 3 3 3 3 3 3 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 3 3 3 3 3 3 3 3 3  
## [778] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 3 3  
## [815] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 5 5 5 5 5 5 5 5 5 5  
## [852] 5 5 5 5 5 5 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 5  
## [889] 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [926] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5  
## [963] 5 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [1000] 3 3 3 3 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [1037] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 5 5 5 5 5 5 5 5 5 5 5 5  
## [1074] 5 5 5 5 5 5 5 5 5 5 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [1111] 3 3 3 3 3 3 3 3 3 3 3 3 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 3 3 3 3 3  
## [1148] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 5 5 5  
## [1185] 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [1222] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 3 3  
## [1259] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 5 5 5 5 5  
## [1296] 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [1333] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 5 5 5 5 5 5 5 5 5 5 5 5  
## [1370] 5 5 5 5 5 5 5 5 5 5 5 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [1407] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5  
## [1444] 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5  
## [1481] 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5  
## [1518] 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5  
## [1555] 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5  
## [1592] 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5  
## [1629] 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5  
## [1666] 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5  
## [1703] 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 4 4 4 5 5 5 5 5 4 4 4  
## [1740] 5 5 5 5 5 4 4 4 5 5 5 5 5 4 4 4 4 4 5 5 5 4 4 4 4 5 4 4 6 4 4 4 4 4 4 4 4  
## [1777] 4 4 6 4 4 4 4 4 4 4 4 4 4 6 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 6 6 6 6 4 4 4  
## [1814] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 6 6 6 6 6 6 1 1 1 1 1 1 4 4 4 4 4 4 4 4 4  
## [1851] 4 4 4 4 4 4 4 4 4 4 4 6 6 6 6 6 6 6 6 6 6 6 6 1 1 1 1 1 1 1 1 4 4 4 4 4 4  
## [1888] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 6 6 6 6 6 6 6 6 1 1 1 1 1 1 1 1 1 1 4 4 4 4  
## [1925] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 6 6 6 6 6 6 6 6 1 1 1 1 1 1 1 1 1 1 1  
## [1962] 1 1 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 6 6 6 6 6 6 6 6 6 6 6 1  
## [1999] 1 1 1 1 1 1 1 1 1 1 1 1 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 6 6  
## [2036] 6 6 6 6 6 6 6 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [2073] 4 4 4 4 4 4 4 4 4 6 6 6 6 6 6 6 6 6 6 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [2110] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 6 6 6 6 6 6 6 6 6 6 6 6 1 1 1 1 1  
## [2147] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [2184] 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 4 4 4  
## [2221] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6  
## [2258] 6 6 6 6 7 7 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 4 4 4 4 4 4 4 4 4 4 4 4  
## [2295] 4 4 4 4 4 4 4 4 4 4 4 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 7 7 7  
## [2332] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [2369] 4 4 4 4 4 4 4 4 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 7 7 7 7 1 1 1  
## [2406] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [2443] 4 4 4 4 4 4 4 4 4 4 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 7 7 7  
## [2480] 7 7 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 4 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [2517] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6  
## [2554] 6 6 7 7 7 7 7 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 4 4 4 4 4 4  
## [2591] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 6 6 6 6 6 6 6 6 6 6 6  
## [2628] 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 7 7 7 7 7 7 7 7 7 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [2665] 1 1 1 1 1 1 1 1 1 1 1 1 1 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [2702] 4 4 4 4 4 4 4 4 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 7 7 7 7  
## [2739] 7 7 7 7 7 7 7 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 4 4 4 4  
## [2776] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 6 6 6 6 6 6 6 6  
## [2813] 6 6 6 6 6 6 6 6 7 7 7 7 7 7 7 7 7 7 7 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [2850] 1 1 1 1 1 1 1 1 1 1 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [2887] 4 4 4 4 4 4 4 4 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 7 7  
## [2924] 7 7 7 7 7 7 7 7 7 7 7 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [2961] 1 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 6  
## [2998] 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 7 7 7 7 7 7 7 7 7  
## [3035] 7 7 7 7 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 4 4 4  
## [3072] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 6 6 6 6 6  
## [3109] 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 7 7 7 7 7 7  
## [3146] 7 7 7 7 7 7 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [3183] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [3220] 4 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 7 7  
## [3257] 7 7 7 7 7 7 7 7 7 7 7 7 7 7 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [3294] 1 1 1 1 1 1 1 1 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [3331] 4 4 4 4 4 4 4 4 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6  
## [3368] 6 6 6 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [3405] 1 1 1 1 1 1 1 1 1 1 1 1 1 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [3442] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6  
## [3479] 6 6 6 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [3516] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [3553] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6  
## [3590] 6 6 6 6 6 6 6 6 6 2 2 2 2 2 2 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 1 1 1 1  
## [3627] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 4 4  
## [3664] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [3701] 4 4 4 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 2  
## [3738] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [3775] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7  
## [3812] 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [3849] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [3886] 4 4 4 4 4 4 4 4 4 4 4 4 4 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6  
## [3923] 6 6 6 6 6 6 6 6 6 6 6 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [3960] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 7 7 7 7 7 7 7 7  
## [3997] 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7  
##   
## Within cluster sum of squares by cluster:  
## [1] 72634.48 44348.64 831375.78 149625.19 311762.63 106331.47 32762.22  
## (between\_SS / total\_SS = 94.6 %)  
##   
## Available components:  
##   
## [1] "cluster" "centers" "totss" "withinss" "tot.withinss"  
## [6] "betweenss" "size" "iter" "ifault"

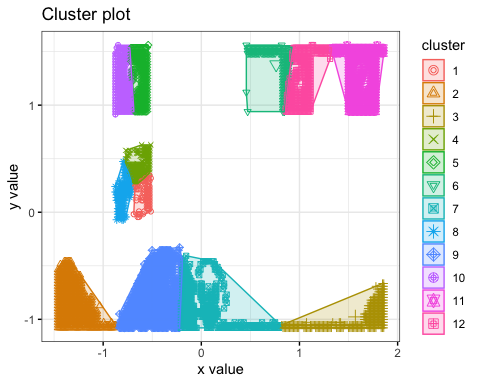
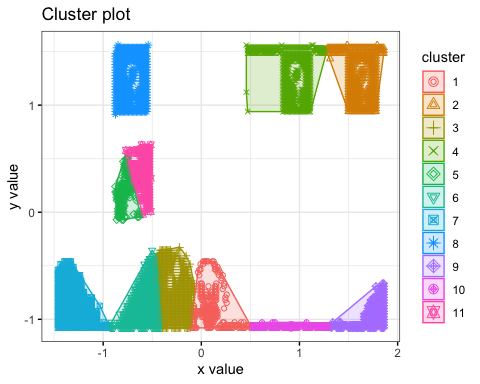
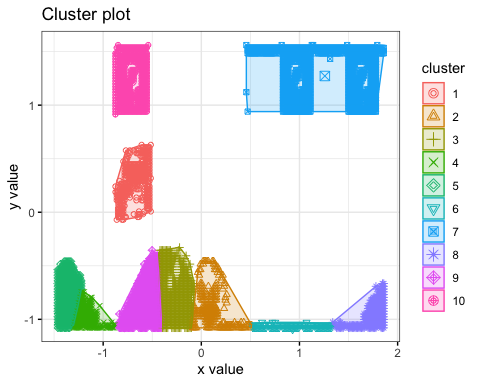
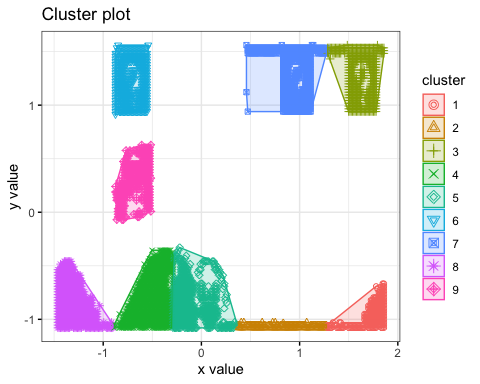
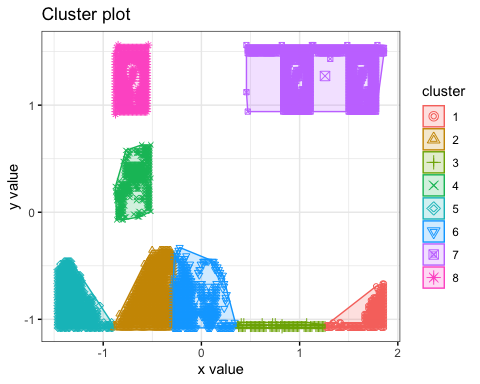
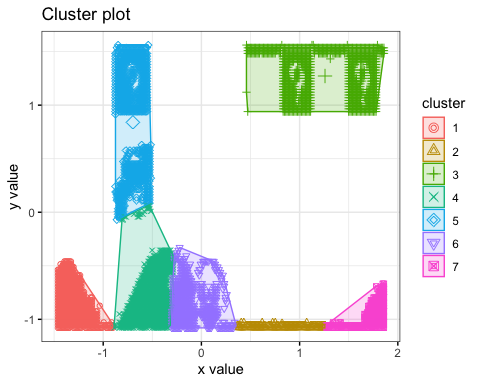
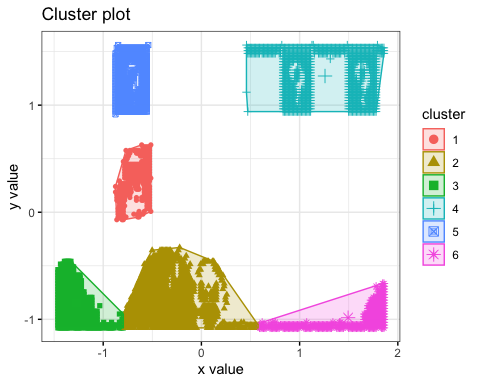
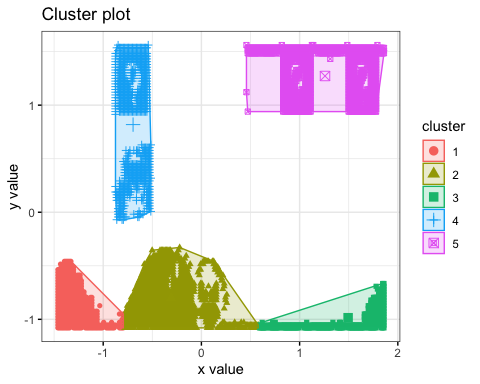
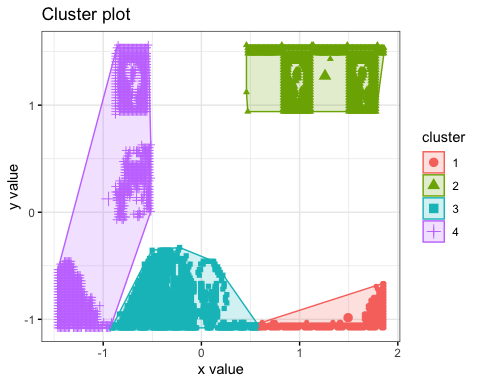
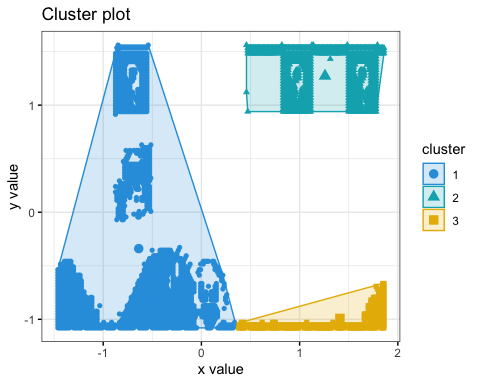
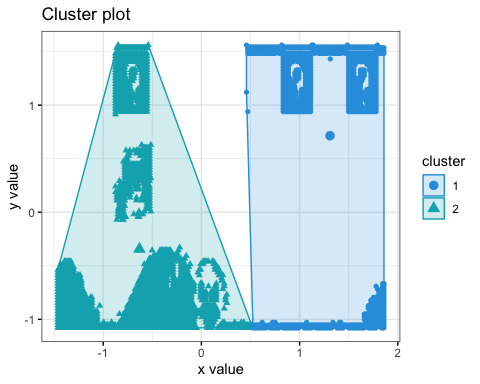
## K-means clustering with 8 clusters of sizes 226, 800, 115, 341, 566, 548, 985, 441  
##   
## Cluster means:  
## x y  
## 1 237.85841 138.8628  
## 2 71.78875 145.4550  
## 3 171.17391 134.5739  
## 4 58.82698 186.9824  
## 5 12.91166 143.2915  
## 6 103.68796 143.7500  
## 7 203.98579 224.8406  
## 8 56.34467 223.0181  
##   
## Clustering vector:  
## [1] 8 8 7 7 7 7 7 7 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 7 7 7 7 7 7  
## [38] 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7  
## [75] 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7  
## [112] 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 8 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7  
## [149] 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7  
## [186] 7 7 7 7 7 7 7 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 7 7 7 7 7 7 7  
## [223] 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7  
## [260] 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7  
## [297] 7 7 7 7 7 7 7 7 7 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 7 7 7 7 7  
## [334] 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7  
## [371] 7 7 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 7 7 7 7 7 7 7 7 7 7 7 7 7 7  
## [408] 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 8 8 8 8 8 8 8 8 8 8  
## [445] 8 8 8 8 8 8 8 8 8 8 8 8 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7  
## [482] 7 7 7 7 7 7 7 7 7 7 7 7 7 7 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 7 7 7 7 7 7 7 7  
## [519] 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 8 8 8 8 8 8 8 8 8 8 8 8 8 7 7 7 7  
## [556] 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 7  
## [593] 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 8 8 8 8 8 8 8 8 8  
## [630] 8 8 8 8 8 8 8 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 8 8  
## [667] 8 8 8 8 8 8 8 8 8 8 8 8 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7  
## [704] 7 7 7 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7  
## [741] 7 7 7 7 7 7 7 7 7 7 7 7 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 7 7 7 7 7 7 7 7 7  
## [778] 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 7 7  
## [815] 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 8 8 8 8 8 8 8 8 8 8  
## [852] 8 8 8 8 8 8 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 8  
## [889] 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7  
## [926] 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8  
## [963] 8 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7  
## [1000] 7 7 7 7 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 7 7 7 7 7 7 7 7 7 7 7 7 7  
## [1037] 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 8 8 8 8 8 8 8 8 8 8 8 8  
## [1074] 8 8 8 8 8 8 8 8 8 8 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7  
## [1111] 7 7 7 7 7 7 7 7 7 7 7 7 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 7 7 7 7 7  
## [1148] 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 8 8 8  
## [1185] 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7  
## [1222] 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 7 7  
## [1259] 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 8 8 8 8 8  
## [1296] 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7  
## [1333] 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 8 8 8 8 8 8 8 8 8 8 8 8  
## [1370] 8 8 8 8 8 8 8 8 8 8 8 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7  
## [1407] 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 8 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [1444] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [1481] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [1518] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [1555] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [1592] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [1629] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [1666] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [1703] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [1740] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 6 2 2 2 2 2 2 2 2  
## [1777] 2 2 6 2 2 2 2 2 2 2 2 2 2 6 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 6 6 6 6 2 2 2  
## [1814] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 6 6 6 6 6 6 5 5 5 5 5 5 2 2 2 2 2 2 2 2 2  
## [1851] 2 2 2 2 2 2 2 2 2 2 2 6 6 6 6 6 6 6 6 6 6 6 6 5 5 5 5 5 5 5 5 2 2 2 2 2 2  
## [1888] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 6 6 6 6 6 6 6 6 5 5 5 5 5 5 5 5 5 5 2 2 2 2  
## [1925] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 6 6 6 6 6 6 6 6 5 5 5 5 5 5 5 5 5 5 5  
## [1962] 5 5 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 6 6 6 6 6 6 6 6 6 6 6 5  
## [1999] 5 5 5 5 5 5 5 5 5 5 5 5 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 6 6  
## [2036] 6 6 6 6 6 6 6 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [2073] 2 2 2 2 2 2 2 2 2 6 6 6 6 6 6 6 6 6 6 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5  
## [2110] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 6 6 6 6 6 6 6 6 6 6 6 5 5 5 5 5  
## [2147] 5 5 5 5 5 5 5 5 5 5 5 5 5 5 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [2184] 2 6 6 6 6 6 6 6 6 6 6 6 6 6 6 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 2 2 2  
## [2221] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6  
## [2258] 6 6 6 6 1 1 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 2 2 2 2 2 2 2 2 2 2 2 2  
## [2295] 2 2 2 2 2 2 2 2 2 2 2 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 1 1 1  
## [2332] 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [2369] 2 2 2 2 2 2 2 2 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 1 1 1 1 5 5 5  
## [2406] 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [2443] 2 2 2 2 2 2 2 2 2 2 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 1 1 1  
## [2480] 1 1 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [2517] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6  
## [2554] 6 6 1 1 1 1 1 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 2 2 2 2 2 2  
## [2591] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 6 6 6 6 6 6 6 6 6 6 6  
## [2628] 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 1 1 1 1 1 1 1 1 1 5 5 5 5 5 5 5 5 5 5 5 5 5  
## [2665] 5 5 5 5 5 5 5 5 5 5 5 5 5 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [2702] 2 2 2 2 2 2 2 2 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 1 1 1 1  
## [2739] 1 1 1 1 1 1 1 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 2 2 2 2  
## [2776] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 6 6 6 6 6 6 6 6  
## [2813] 6 6 6 6 6 6 6 6 1 1 1 1 1 1 1 1 1 1 1 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5  
## [2850] 5 5 5 5 5 5 5 5 5 5 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [2887] 2 2 2 2 2 2 2 2 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 1 1  
## [2924] 1 1 1 1 1 1 1 1 1 1 1 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5  
## [2961] 5 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 6  
## [2998] 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 1 1 1 1 1 1 1 1 1  
## [3035] 1 1 1 1 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 2 2 2  
## [3072] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 6 6 6 6  
## [3109] 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 1 1 1 1 1 1  
## [3146] 1 1 1 1 1 1 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5  
## [3183] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [3220] 2 2 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 1 1  
## [3257] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5  
## [3294] 5 5 5 5 5 5 5 5 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [3331] 2 2 2 2 2 2 2 2 2 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6  
## [3368] 6 6 6 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5  
## [3405] 5 5 5 5 5 5 5 5 5 5 5 5 5 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [3442] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6  
## [3479] 6 6 6 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5  
## [3516] 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [3553] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6  
## [3590] 6 6 6 6 6 6 6 6 6 3 3 3 3 3 3 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 5 5 5 5  
## [3627] 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 2 2  
## [3664] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [3701] 2 2 2 2 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 3  
## [3738] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [3775] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [3812] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5  
## [3849] 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [3886] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6  
## [3923] 6 6 6 6 6 6 6 6 6 6 6 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [3960] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 1 1 1 1 1 1 1 1  
## [3997] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
##   
## Within cluster sum of squares by cluster:  
## [1] 32762.22 132473.68 44348.64 35774.69 72634.48 103186.39 831375.78  
## [8] 47345.46  
## (between\_SS / total\_SS = 95.5 %)  
##   
## Available components:  
##   
## [1] "cluster" "centers" "totss" "withinss" "tot.withinss"  
## [6] "betweenss" "size" "iter" "ifault"

## K-means clustering with 9 clusters of sizes 224, 116, 467, 801, 548, 441, 518, 566, 341  
##   
## Cluster means:  
## x y  
## 1 238.15179 138.9018  
## 2 172.05172 134.5690  
## 3 231.08994 224.3683  
## 4 71.80899 145.4594  
## 5 103.77737 143.7245  
## 6 56.34467 223.0181  
## 7 179.55019 225.2664  
## 8 12.91166 143.2915  
## 9 58.82698 186.9824  
##   
## Clustering vector:  
## [1] 6 6 7 7 7 7 3 3 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 7 7 7 7 7 7  
## [38] 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7  
## [75] 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [112] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 6 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7  
## [149] 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [186] 3 3 3 3 3 3 3 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 7 7 7 7 7 7 7  
## [223] 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7  
## [260] 7 7 7 7 7 7 7 7 7 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [297] 3 3 3 3 3 3 3 3 3 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 7 7 7 7 7  
## [334] 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [371] 3 3 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 7 7 7 7 7 7 7 7 7 7 7 7 7 7  
## [408] 7 7 7 7 7 7 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 6 6 6 6 6 6 6 6 6 6  
## [445] 6 6 6 6 6 6 6 6 6 6 6 6 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 3 3 3 3 3  
## [482] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 7 7 7 7 7 7 7 7  
## [519] 7 7 7 7 7 7 3 3 3 3 3 3 3 3 3 3 3 3 3 3 6 6 6 6 6 6 6 6 6 6 6 6 6 7 7 7 7  
## [556] 7 7 7 7 7 7 7 7 3 3 3 3 3 3 3 3 3 3 3 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 7  
## [593] 7 7 7 7 7 7 7 7 7 7 7 7 7 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 6 6 6 6 6 6 6 6 6  
## [630] 6 6 6 6 6 6 6 7 7 7 7 7 7 7 7 7 7 7 7 7 7 3 3 3 3 3 3 3 3 3 3 3 3 3 3 6 6  
## [667] 6 6 6 6 6 6 6 6 6 6 6 6 7 7 7 7 7 7 7 7 7 7 7 7 7 7 3 3 3 3 3 3 3 3 3 3 3  
## [704] 3 3 3 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 3 3 3  
## [741] 3 3 3 3 3 3 3 3 3 3 3 3 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 7 7 7 7 7 7 7 7 7  
## [778] 7 7 7 7 7 3 3 3 3 3 3 3 3 3 3 3 3 3 3 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 7 7  
## [815] 7 7 7 7 7 7 7 7 7 7 7 7 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 6 6 6 6 6 6 6 6 6 6  
## [852] 6 6 6 6 6 6 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 6  
## [889] 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 3  
## [926] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6  
## [963] 6 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [1000] 3 3 3 3 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 7 7 7 7 7 7 7 7 7 7 7 7 7  
## [1037] 7 7 7 7 7 7 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 6 6 6 6 6 6 6 6 6 6 6 6  
## [1074] 6 6 6 6 6 6 6 6 6 6 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 3 3 3 3 3 3 3 3  
## [1111] 3 3 3 3 3 3 3 3 3 3 3 3 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 7 7 7 7 7  
## [1148] 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 6 6 6  
## [1185] 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 3 3  
## [1222] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 7 7  
## [1259] 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 6 6 6 6 6  
## [1296] 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7  
## [1333] 7 7 7 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 6 6 6 6 6 6 6 6 6 6 6 6  
## [1370] 6 6 6 6 6 6 6 6 6 6 6 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 3 3 3  
## [1407] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 6 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9  
## [1444] 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9  
## [1481] 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9  
## [1518] 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9  
## [1555] 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9  
## [1592] 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9  
## [1629] 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9  
## [1666] 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9  
## [1703] 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9  
## [1740] 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 5 4 4 4 4 4 4 4 4  
## [1777] 4 4 5 4 4 4 4 4 4 4 4 4 4 5 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 5 5 5 5 4 4 4  
## [1814] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 5 5 5 5 5 5 8 8 8 8 8 8 4 4 4 4 4 4 4 4 4  
## [1851] 4 4 4 4 4 4 4 4 4 4 4 5 5 5 5 5 5 5 5 5 5 5 5 8 8 8 8 8 8 8 8 4 4 4 4 4 4  
## [1888] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 5 5 5 5 5 5 5 5 8 8 8 8 8 8 8 8 8 8 4 4 4 4  
## [1925] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 5 5 5 5 5 5 5 5 8 8 8 8 8 8 8 8 8 8 8  
## [1962] 8 8 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 5 5 5 5 5 5 5 5 5 5 5 8  
## [1999] 8 8 8 8 8 8 8 8 8 8 8 8 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 5 5  
## [2036] 5 5 5 5 5 5 5 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [2073] 4 4 4 4 4 4 4 4 4 5 5 5 5 5 5 5 5 5 5 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8  
## [2110] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 5 5 5 5 5 5 5 5 5 5 5 8 8 8 8 8  
## [2147] 8 8 8 8 8 8 8 8 8 8 8 8 8 8 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [2184] 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 4 4 4  
## [2221] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5  
## [2258] 5 5 5 5 1 1 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 4 4 4 4 4 4 4 4 4 4 4 4  
## [2295] 4 4 4 4 4 4 4 4 4 4 4 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 1 1 1  
## [2332] 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [2369] 4 4 4 4 4 4 4 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 1 1 1 1 8 8 8  
## [2406] 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [2443] 4 4 4 4 4 4 4 4 4 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 1 1 1  
## [2480] 1 1 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 4 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [2517] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5  
## [2554] 5 5 1 1 1 1 1 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 4 4 4 4 4 4  
## [2591] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 5 5 5 5 5 5 5 5 5 5 5  
## [2628] 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 1 1 1 1 1 1 1 1 1 8 8 8 8 8 8 8 8 8 8 8 8 8  
## [2665] 8 8 8 8 8 8 8 8 8 8 8 8 8 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [2702] 4 4 4 4 4 4 4 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 1 1 1 1  
## [2739] 1 1 1 1 1 1 1 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 4 4 4 4  
## [2776] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 5 5 5 5 5 5 5 5  
## [2813] 5 5 5 5 5 5 5 5 1 1 1 1 1 1 1 1 1 1 1 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8  
## [2850] 8 8 8 8 8 8 8 8 8 8 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [2887] 4 4 4 4 4 4 4 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 1 1  
## [2924] 1 1 1 1 1 1 1 1 1 1 1 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8  
## [2961] 8 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 5  
## [2998] 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 1 1 1 1 1 1 1 1 1  
## [3035] 1 1 1 1 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 4 4 4  
## [3072] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 5 5 5 5  
## [3109] 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 1 1 1 1 1 1  
## [3146] 1 1 1 1 1 1 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8  
## [3183] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [3220] 4 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 1 1  
## [3257] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8  
## [3294] 8 8 8 8 8 8 8 8 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [3331] 4 4 4 4 4 4 4 4 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5  
## [3368] 5 5 5 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8  
## [3405] 8 8 8 8 8 8 8 8 8 8 8 8 8 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [3442] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5  
## [3479] 5 5 5 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8  
## [3516] 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [3553] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5  
## [3590] 5 5 5 5 5 5 5 5 5 2 2 2 2 2 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 8 8 8 8  
## [3627] 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 4 4  
## [3664] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [3701] 4 4 4 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5  
## [3738] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [3775] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [3812] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8  
## [3849] 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [3886] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5  
## [3923] 5 5 5 5 5 5 5 5 5 5 5 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [3960] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 1 1 1 1 1 1 1  
## [3997] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
##   
## Within cluster sum of squares by cluster:  
## [1] 30544.68 45380.14 65846.87 132748.71 104094.23 47345.46 112959.43  
## [8] 72634.48 35774.69  
## (between\_SS / total\_SS = 97.7 %)  
##   
## Available components:  
##   
## [1] "cluster" "centers" "totss" "withinss" "tot.withinss"  
## [6] "betweenss" "size" "iter" "ifault"

## K-means clustering with 10 clusters of sizes 341, 231, 600, 196, 373, 107, 985, 216, 532, 441  
##   
## Cluster means:  
## x y  
## 1 58.826979 186.9824  
## 2 118.696970 141.4589  
## 3 89.756667 146.6700  
## 4 23.489796 138.3980  
## 5 7.597855 145.7936  
## 6 179.355140 134.5514  
## 7 203.985787 224.8406  
## 8 239.287037 139.0648  
## 9 66.565789 143.7594  
## 10 56.344671 223.0181  
##   
## Clustering vector:  
## [1] 10 10 7 7 7 7 7 7 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10  
## [25] 10 10 10 10 10 10 10 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7  
## [49] 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7  
## [73] 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7  
## [97] 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7  
## [121] 7 7 7 7 7 7 7 7 7 7 7 10 7 7 7 7 7 7 7 7 7 7 7 7  
## [145] 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7  
## [169] 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7  
## [193] 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 7  
## [217] 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7  
## [241] 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7  
## [265] 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7  
## [289] 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 10 10 10 10 10 10 10  
## [313] 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 7 7 7 7 7 7 7 7  
## [337] 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7  
## [361] 7 7 7 7 7 7 7 7 7 7 7 7 10 10 10 10 10 10 10 10 10 10 10 10  
## [385] 10 10 10 10 10 10 10 10 10 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7  
## [409] 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7  
## [433] 7 7 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10  
## [457] 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7  
## [481] 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 10 10 10 10 10 10 10 10 10  
## [505] 10 10 10 10 10 10 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7  
## [529] 7 7 7 7 7 7 7 7 7 7 10 10 10 10 10 10 10 10 10 10 10 10 10 7  
## [553] 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 10 10  
## [577] 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 7 7 7 7 7 7 7 7 7  
## [601] 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 10 10 10 10  
## [625] 10 10 10 10 10 10 10 10 10 10 10 10 7 7 7 7 7 7 7 7 7 7 7 7  
## [649] 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 10 10 10 10 10 10 10 10  
## [673] 10 10 10 10 10 10 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7  
## [697] 7 7 7 7 7 7 7 7 7 7 10 10 10 10 10 10 10 10 10 10 10 10 10 10  
## [721] 10 10 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7  
## [745] 7 7 7 7 7 7 7 7 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10  
## [769] 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7  
## [793] 7 7 7 7 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 7 7 7 7  
## [817] 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7  
## [841] 7 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 7 7 7 7 7 7 7  
## [865] 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 10  
## [889] 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 7 7 7 7 7 7  
## [913] 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7  
## [937] 7 7 7 7 7 7 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10  
## [961] 10 10 10 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7  
## [985] 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 10 10 10 10 10  
## [1009] 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 7 7 7 7 7 7 7 7 7  
## [1033] 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7  
## [1057] 7 7 7 7 7 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10  
## [1081] 10 10 10 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7  
## [1105] 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 10 10 10 10 10 10  
## [1129] 10 10 10 10 10 10 10 10 10 10 10 10 10 10 7 7 7 7 7 7 7 7 7 7  
## [1153] 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7  
## [1177] 7 7 7 7 7 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10  
## [1201] 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7  
## [1225] 7 7 7 7 7 7 7 7 7 7 7 7 7 10 10 10 10 10 10 10 10 10 10 10  
## [1249] 10 10 10 10 10 10 10 10 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7  
## [1273] 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 10 10 10 10 10 10  
## [1297] 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 7 7 7 7 7 7 7  
## [1321] 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7  
## [1345] 7 7 7 7 7 7 7 7 7 7 7 7 7 10 10 10 10 10 10 10 10 10 10 10  
## [1369] 10 10 10 10 10 10 10 10 10 10 10 10 7 7 7 7 7 7 7 7 7 7 7 7  
## [1393] 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7  
## [1417] 7 7 7 7 7 7 7 7 7 10 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [1441] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [1465] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [1489] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [1513] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [1537] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [1561] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [1585] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [1609] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [1633] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [1657] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [1681] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [1705] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [1729] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [1753] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 3 9 3 3 3 3 3 3 3  
## [1777] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 9 9 9 9 3 3 3 3 3 3  
## [1801] 3 3 3 3 3 3 3 3 3 3 9 9 9 9 9 9 9 3 3 3 3 3 3 3  
## [1825] 3 3 3 3 3 3 3 3 3 3 3 5 5 5 5 5 5 9 9 9 9 9 9 9  
## [1849] 9 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 2 2 2 2 2 2  
## [1873] 2 5 5 5 5 5 5 5 5 9 9 9 9 9 9 9 9 9 3 3 3 3 3 3  
## [1897] 3 3 3 3 3 3 3 3 3 3 2 2 2 2 5 5 5 5 5 5 5 5 5 5  
## [1921] 9 9 9 9 9 9 9 9 9 9 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [1945] 3 3 3 3 2 2 5 5 5 5 5 5 5 5 5 5 5 5 5 9 9 9 9 9  
## [1969] 9 9 9 9 9 9 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [1993] 2 2 2 2 2 5 5 5 5 5 5 5 5 5 5 5 5 5 9 9 9 9 9 9  
## [2017] 9 9 9 9 9 9 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 2  
## [2041] 2 2 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 9 9 9 9 9  
## [2065] 9 9 9 9 9 9 9 9 9 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [2089] 2 2 2 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 9 9 9  
## [2113] 9 9 9 9 9 9 9 9 9 9 9 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [2137] 3 3 3 3 2 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5  
## [2161] 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 3 3 3 3 3 3 3 3  
## [2185] 3 3 3 3 3 3 3 3 3 3 3 3 3 2 5 5 5 5 5 5 5 5 5 5  
## [2209] 5 5 5 5 5 5 5 5 5 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9  
## [2233] 9 9 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [2257] 3 2 2 2 2 8 8 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5  
## [2281] 5 5 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 3 3 3 3 3  
## [2305] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 2 2 2 2 2 2  
## [2329] 8 8 8 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 9 9  
## [2353] 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 3 3 3 3 3 3 3  
## [2377] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 2 2 2 2 2 8 8  
## [2401] 8 8 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 4 4 4 9  
## [2425] 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 3 3 3 3 3 3  
## [2449] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 2 2 2  
## [2473] 2 2 2 2 8 8 8 8 8 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5  
## [2497] 5 5 5 4 4 4 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9  
## [2521] 9 9 9 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [2545] 3 3 3 2 2 2 2 2 2 2 2 8 8 8 8 8 5 5 5 5 5 5 5 5  
## [2569] 5 5 5 5 5 5 5 5 5 4 4 4 4 4 4 4 9 9 9 9 9 9 9 9  
## [2593] 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 3 3 3 3 3 3 3 3 3  
## [2617] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 2 2 2 2 2 2 2 2 2  
## [2641] 2 2 8 8 8 8 8 8 8 8 8 5 5 5 5 5 5 5 5 5 5 5 5 5  
## [2665] 5 5 5 5 4 4 4 4 4 4 4 4 4 9 9 9 9 9 9 9 9 9 9 9  
## [2689] 9 9 9 9 9 9 9 9 9 9 9 9 3 3 3 3 3 3 3 3 3 3 3 3  
## [2713] 3 3 3 3 3 3 3 3 3 3 3 3 2 2 2 2 2 2 2 2 2 2 8 8  
## [2737] 8 8 8 8 8 8 8 8 8 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5  
## [2761] 5 4 4 4 4 4 4 4 4 4 4 9 9 9 9 9 9 9 9 9 9 9 9 9  
## [2785] 9 9 9 9 9 9 9 9 9 9 9 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [2809] 3 3 3 3 3 3 3 3 3 3 3 2 8 8 8 8 8 8 8 8 8 8 8 5  
## [2833] 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 4 4 4 4 4 4 4 4 4  
## [2857] 4 4 4 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9  
## [2881] 9 9 9 9 9 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [2905] 3 3 3 3 3 3 2 2 2 2 2 2 2 2 2 2 2 8 8 8 8 8 8 8  
## [2929] 8 8 8 8 8 8 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 4 4  
## [2953] 4 4 4 4 4 4 4 4 4 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9  
## [2977] 9 9 9 9 9 9 9 9 9 9 9 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [3001] 3 3 3 3 3 3 3 3 3 3 3 3 2 2 2 2 2 2 2 2 2 2 2 2  
## [3025] 2 8 8 8 8 8 8 8 8 8 8 8 8 8 5 5 5 5 5 5 5 5 5 5  
## [3049] 5 5 5 5 5 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 9 9 9 9  
## [3073] 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 3  
## [3097] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [3121] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 8 8 8 8 8  
## [3145] 8 8 8 8 8 8 8 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 4 4  
## [3169] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 9 9 9 9 9 9 9 9 9 9  
## [3193] 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 3 3 3 3  
## [3217] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 2 2 2  
## [3241] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 8 8 8 8 8 8 8 8 8 8  
## [3265] 8 8 8 8 8 8 5 5 5 5 5 5 5 5 5 5 5 5 5 5 4 4 4 4  
## [3289] 4 4 4 4 4 4 4 4 4 4 4 4 4 9 9 9 9 9 9 9 9 9 9 9  
## [3313] 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 3 3 3 3 3  
## [3337] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 2 2 2 2 2  
## [3361] 2 2 2 2 2 2 2 2 2 2 8 8 8 8 8 8 8 8 8 8 8 8 8 8  
## [3385] 8 8 5 5 5 5 5 5 5 5 5 5 5 5 5 5 4 4 4 4 4 4 4 4  
## [3409] 4 4 4 4 4 4 4 4 4 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9  
## [3433] 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 3 3 3 3 3 3 3 3  
## [3457] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 2 2 2 2 2 2 2 2 2  
## [3481] 2 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 5 5 5 5 5 5 5  
## [3505] 5 5 5 5 5 5 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [3529] 4 4 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9  
## [3553] 9 9 9 9 9 9 9 9 9 9 9 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [3577] 3 3 3 3 3 3 3 3 3 3 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [3601] 6 6 6 6 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 5 5  
## [3625] 5 5 5 5 5 5 5 5 5 5 5 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [3649] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 9 9 9 9 9 9 9 9 9  
## [3673] 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9  
## [3697] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 2  
## [3721] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [3745] 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6  
## [3769] 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6  
## [3793] 6 6 6 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8  
## [3817] 8 8 8 8 8 8 8 8 8 8 8 8 5 5 5 5 5 5 5 5 5 5 4 4  
## [3841] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [3865] 4 4 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9  
## [3889] 9 9 9 9 9 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [3913] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [3937] 2 2 2 2 2 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6  
## [3961] 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6  
## [3985] 6 6 6 6 6 6 6 6 6 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8  
## [4009] 8 8 8 8 8 8 8 8 8 8 8 8 8 8  
##   
## Within cluster sum of squares by cluster:  
## [1] 35774.69 33108.15 70203.13 11925.94 24216.78 34946.97 831375.78  
## [8] 22577.30 58367.90 47345.46  
## (between\_SS / total\_SS = 95.9 %)  
##   
## Available components:  
##   
## [1] "cluster" "centers" "totss" "withinss" "tot.withinss"  
## [6] "betweenss" "size" "iter" "ifault"

## K-means clustering with 11 clusters of sizes 233, 467, 616, 518, 142, 521, 560, 441, 218, 107, 199  
##   
## Cluster means:  
## x y  
## 1 118.17167 141.4549  
## 2 231.08994 224.3683  
## 3 89.27110 146.7792  
## 4 179.55019 225.2664  
## 5 51.16197 183.0423  
## 6 65.72169 143.4299  
## 7 12.61071 143.3839  
## 8 56.34467 223.0181  
## 9 239.00917 139.0229  
## 10 178.21495 134.5514  
## 11 64.29648 189.7940  
##   
## Clustering vector:  
## [1] 8 8 4 4 4 4 2 2 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8  
## [25] 8 8 8 8 8 8 8 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [49] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [73] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 2 2 2 2 2 2 2  
## [97] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [121] 2 2 2 2 2 2 2 2 2 2 2 8 4 4 4 4 4 4 4 4 4 4 4 4  
## [145] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [169] 4 4 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [193] 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 4  
## [217] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [241] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [265] 4 4 4 4 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [289] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 8 8 8 8 8 8 8  
## [313] 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 4 4 4 4 4 4 4 4  
## [337] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 2 2 2 2 2 2 2 2 2 2  
## [361] 2 2 2 2 2 2 2 2 2 2 2 2 8 8 8 8 8 8 8 8 8 8 8 8  
## [385] 8 8 8 8 8 8 8 8 8 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [409] 4 4 4 4 4 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [433] 2 2 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8  
## [457] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 2 2 2 2  
## [481] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 8 8 8 8 8 8 8 8 8  
## [505] 8 8 8 8 8 8 4 4 4 4 4 4 4 4 4 4 4 4 4 4 2 2 2 2  
## [529] 2 2 2 2 2 2 2 2 2 2 8 8 8 8 8 8 8 8 8 8 8 8 8 4  
## [553] 4 4 4 4 4 4 4 4 4 4 4 2 2 2 2 2 2 2 2 2 2 2 8 8  
## [577] 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 4 4 4 4 4 4 4 4 4  
## [601] 4 4 4 4 4 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 8 8 8 8  
## [625] 8 8 8 8 8 8 8 8 8 8 8 8 4 4 4 4 4 4 4 4 4 4 4 4  
## [649] 4 4 2 2 2 2 2 2 2 2 2 2 2 2 2 2 8 8 8 8 8 8 8 8  
## [673] 8 8 8 8 8 8 4 4 4 4 4 4 4 4 4 4 4 4 4 4 2 2 2 2  
## [697] 2 2 2 2 2 2 2 2 2 2 8 8 8 8 8 8 8 8 8 8 8 8 8 8  
## [721] 8 8 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 2 2 2 2 2 2 2  
## [745] 2 2 2 2 2 2 2 2 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8  
## [769] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 2 2 2 2 2 2 2 2 2 2  
## [793] 2 2 2 2 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 4 4 4 4  
## [817] 4 4 4 4 4 4 4 4 4 4 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [841] 2 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 4 4 4 4 4 4 4  
## [865] 4 4 4 4 4 4 4 4 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 8  
## [889] 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 4 4 4 4 4 4  
## [913] 4 4 4 4 4 4 4 4 4 4 4 4 2 2 2 2 2 2 2 2 2 2 2 2  
## [937] 2 2 2 2 2 2 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8  
## [961] 8 8 8 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 2  
## [985] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 8 8 8 8 8  
## [1009] 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 4 4 4 4 4 4 4 4 4  
## [1033] 4 4 4 4 4 4 4 4 4 4 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [1057] 2 2 2 2 2 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8  
## [1081] 8 8 8 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 2 2  
## [1105] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 8 8 8 8 8 8  
## [1129] 8 8 8 8 8 8 8 8 8 8 8 8 8 8 4 4 4 4 4 4 4 4 4 4  
## [1153] 4 4 4 4 4 4 4 4 4 4 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [1177] 2 2 2 2 2 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8  
## [1201] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 2 2 2 2 2  
## [1225] 2 2 2 2 2 2 2 2 2 2 2 2 2 8 8 8 8 8 8 8 8 8 8 8  
## [1249] 8 8 8 8 8 8 8 8 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [1273] 4 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 8 8 8 8 8 8  
## [1297] 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 4 4 4 4 4 4 4  
## [1321] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 2 2 2 2 2 2 2 2 2  
## [1345] 2 2 2 2 2 2 2 2 2 2 2 2 2 8 8 8 8 8 8 8 8 8 8 8  
## [1369] 8 8 8 8 8 8 8 8 8 8 8 8 4 4 4 4 4 4 4 4 4 4 4 4  
## [1393] 4 4 4 4 4 4 4 4 4 4 4 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [1417] 2 2 2 2 2 2 2 2 2 8 11 11 11 11 11 11 11 11 11 11 11 11 11 11  
## [1441] 11 11 11 11 11 11 11 11 11 11 11 11 11 11 11 11 11 11 11 11 11 11 11 11  
## [1465] 11 11 11 5 5 11 11 11 11 5 5 11 11 11 11 11 11 5 5 5 5 11 11 11  
## [1489] 11 11 11 11 11 11 11 11 11 11 11 11 5 5 5 5 11 11 11 11 11 11 11 11  
## [1513] 11 11 11 11 11 11 11 5 5 5 5 5 11 11 11 11 11 11 11 11 11 11 11 11  
## [1537] 11 11 11 5 5 5 5 5 11 11 11 11 11 11 11 11 11 11 11 11 11 11 11 5  
## [1561] 5 5 5 5 5 11 11 11 11 11 11 11 11 11 11 11 11 11 5 5 5 5 5 11  
## [1585] 11 11 11 11 11 11 11 11 11 11 11 11 5 5 5 5 5 11 11 11 11 11 11 11  
## [1609] 11 11 11 11 11 5 5 5 5 5 5 5 5 11 11 11 11 11 11 5 5 5 5 5  
## [1633] 5 5 5 5 5 11 11 11 11 11 11 11 5 5 5 5 5 5 5 5 5 11 11 11  
## [1657] 11 11 11 11 5 5 5 5 5 5 5 5 5 5 5 5 5 11 11 11 11 5 5 5  
## [1681] 5 5 5 5 5 5 11 11 11 11 5 5 5 5 5 5 5 5 5 11 11 11 11 11  
## [1705] 5 5 5 5 5 5 5 5 11 11 11 11 11 5 5 5 11 11 11 5 5 5 5 5  
## [1729] 11 11 11 5 5 5 5 5 11 11 11 5 5 5 5 5 5 11 11 5 5 5 5 5  
## [1753] 5 5 5 5 11 5 5 5 5 5 5 5 5 5 5 3 6 3 3 3 3 3 3 3  
## [1777] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 6 6 6 3 3 3 3 3 3 3  
## [1801] 3 3 3 3 3 3 3 3 3 3 6 6 6 6 6 6 3 3 3 3 3 3 3 3  
## [1825] 3 3 3 3 3 3 3 3 3 3 3 7 7 7 7 7 7 6 6 6 6 6 6 6  
## [1849] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 1 1 1 1 1 1  
## [1873] 1 7 7 7 7 7 7 7 7 6 6 6 6 6 6 6 6 3 3 3 3 3 3 3  
## [1897] 3 3 3 3 3 3 3 3 3 3 1 1 1 1 7 7 7 7 7 7 7 7 7 7  
## [1921] 6 6 6 6 6 6 6 6 6 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [1945] 3 3 3 3 1 1 7 7 7 7 7 7 7 7 7 7 7 7 7 6 6 6 6 6  
## [1969] 6 6 6 6 6 6 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [1993] 1 1 1 1 1 7 7 7 7 7 7 7 7 7 7 7 7 7 6 6 6 6 6 6  
## [2017] 6 6 6 6 6 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 1  
## [2041] 1 1 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 6 6 6 6 6  
## [2065] 6 6 6 6 6 6 6 6 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [2089] 1 1 1 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 6 6 6  
## [2113] 6 6 6 6 6 6 6 6 6 6 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [2137] 3 3 3 3 1 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7  
## [2161] 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 3 3 3 3 3 3 3 3 3  
## [2185] 3 3 3 3 3 3 3 3 3 3 3 3 3 1 7 7 7 7 7 7 7 7 7 7  
## [2209] 7 7 7 7 7 7 7 7 7 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6  
## [2233] 6 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [2257] 3 1 1 1 1 9 9 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7  
## [2281] 7 7 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 3 3 3 3 3 3  
## [2305] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 1 1 1 1 1 1  
## [2329] 9 9 9 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 6 6  
## [2353] 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 3 3 3 3 3 3 3  
## [2377] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 1 1 1 1 1 9 9  
## [2401] 9 9 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 6  
## [2425] 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 3 3 3 3 3 3  
## [2449] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 1 1 1  
## [2473] 1 1 1 1 9 9 9 9 9 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7  
## [2497] 7 7 7 7 7 7 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6  
## [2521] 6 6 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [2545] 3 3 3 1 1 1 1 1 1 1 1 9 9 9 9 9 7 7 7 7 7 7 7 7  
## [2569] 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 6 6 6 6 6 6 6 6  
## [2593] 6 6 6 6 6 6 6 6 6 6 6 6 6 6 3 3 3 3 3 3 3 3 3 3  
## [2617] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 1 1 1 1 1 1 1 1 1  
## [2641] 1 1 9 9 9 9 9 9 9 9 9 7 7 7 7 7 7 7 7 7 7 7 7 7  
## [2665] 7 7 7 7 7 7 7 7 7 7 7 7 7 6 6 6 6 6 6 6 6 6 6 6  
## [2689] 6 6 6 6 6 6 6 6 6 6 6 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [2713] 3 3 3 3 3 3 3 3 3 3 3 3 1 1 1 1 1 1 1 1 1 1 9 9  
## [2737] 9 9 9 9 9 9 9 9 9 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7  
## [2761] 7 7 7 7 7 7 7 7 7 7 7 6 6 6 6 6 6 6 6 6 6 6 6 6  
## [2785] 6 6 6 6 6 6 6 6 6 6 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [2809] 3 3 3 3 3 3 3 3 3 3 3 1 9 9 9 9 9 9 9 9 9 9 9 7  
## [2833] 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7  
## [2857] 7 7 7 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6  
## [2881] 6 6 6 6 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [2905] 3 3 3 3 3 3 1 1 1 1 1 1 1 1 1 1 1 9 9 9 9 9 9 9  
## [2929] 9 9 9 9 9 9 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7  
## [2953] 7 7 7 7 7 7 7 7 7 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6  
## [2977] 6 6 6 6 6 6 6 6 6 6 6 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [3001] 3 3 3 3 3 3 3 3 3 3 3 3 1 1 1 1 1 1 1 1 1 1 1 1  
## [3025] 1 9 9 9 9 9 9 9 9 9 9 9 9 9 7 7 7 7 7 7 7 7 7 7  
## [3049] 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 6 6 6 6  
## [3073] 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 3  
## [3097] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 1  
## [3121] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 9 9 9 9 9  
## [3145] 9 9 9 9 9 9 9 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7  
## [3169] 7 7 7 7 7 7 7 7 7 7 7 7 7 7 6 6 6 6 6 6 6 6 6 6  
## [3193] 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 3 3 3 3  
## [3217] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 1 1 1 1  
## [3241] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 9 9 9 9 9 9 9 9 9 9  
## [3265] 9 9 9 9 9 9 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7  
## [3289] 7 7 7 7 7 7 7 7 7 7 7 7 7 6 6 6 6 6 6 6 6 6 6 6  
## [3313] 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 3 3 3 3 3 3  
## [3337] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 1 1 1 1 1 1  
## [3361] 1 1 1 1 1 1 1 1 1 1 9 9 9 9 9 9 9 9 9 9 9 9 9 9  
## [3385] 9 9 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7  
## [3409] 7 7 7 7 7 7 7 7 7 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6  
## [3433] 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 3 3 3 3 3 3 3 3 3  
## [3457] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 1 1 1 1 1 1 1 1 1  
## [3481] 1 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 7 7 7 7 7 7 7  
## [3505] 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7  
## [3529] 7 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6  
## [3553] 6 6 6 6 6 6 6 6 6 6 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [3577] 3 3 3 3 3 3 3 3 3 3 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [3601] 10 10 10 10 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 7 7  
## [3625] 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7  
## [3649] 7 7 7 7 7 7 7 7 7 7 7 6 6 6 6 6 6 6 6 6 6 6 6 6  
## [3673] 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 3  
## [3697] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 1  
## [3721] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 10  
## [3745] 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10  
## [3769] 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10  
## [3793] 10 10 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9  
## [3817] 9 9 9 9 9 9 9 9 9 9 9 9 7 7 7 7 7 7 7 7 7 7 7 7  
## [3841] 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 6 6  
## [3865] 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6  
## [3889] 6 6 6 6 6 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 1  
## [3913] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [3937] 1 1 1 1 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10  
## [3961] 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10  
## [3985] 10 10 10 10 10 10 10 10 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9  
## [4009] 9 9 9 9 9 9 9 9 9 9 9 9 9 9  
##   
## Within cluster sum of squares by cluster:  
## [1] 32322.910 65846.874 73385.700 112959.431 6831.021 60236.338  
## [7] 67391.591 47345.465 24436.867 35016.523 10870.060  
## (between\_SS / total\_SS = 98.1 %)  
##   
## Available components:  
##   
## [1] "cluster" "centers" "totss" "withinss" "tot.withinss"  
## [6] "betweenss" "size" "iter" "ifault"

## K-means clustering with 12 clusters of sizes 66, 569, 286, 157, 204, 185, 465, 118, 935, 237, 456, 344  
##   
## Cluster means:  
## x y  
## 1 66.31818 181.7424  
## 2 13.07206 143.2460  
## 3 227.28322 137.9580  
## 4 62.28025 192.5541  
## 5 63.48039 223.9265  
## 6 166.78378 228.9946  
## 7 113.30968 142.2000  
## 8 50.04237 182.5000  
## 9 74.72834 145.4706  
## 10 50.20253 222.2363  
## 11 231.66009 224.1382  
## 12 187.30814 223.5378  
##   
## Clustering vector:  
## [1] 10 5 6 6 12 12 11 11 10 10 10 10 10 10 10 10 10 10 5 5 5 5 5 5  
## [25] 5 5 5 5 5 5 5 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6  
## [49] 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 12 12 12 12 12 12 12  
## [73] 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 11 11 11  
## [97] 11 11 11 11 11 11 11 11 11 11 11 11 11 11 11 11 11 11 11 11 11 11 11 11  
## [121] 11 11 11 11 11 11 11 11 11 11 11 10 6 6 6 6 6 6 6 6 6 6 6 6  
## [145] 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 12 12 12 12 12 12 12 12 12  
## [169] 12 12 12 12 12 12 11 11 11 11 11 11 11 11 11 11 11 11 11 11 11 11 11 11  
## [193] 10 10 10 10 10 10 10 10 10 10 5 5 5 5 5 5 5 5 5 5 5 5 5 6  
## [217] 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6  
## [241] 6 6 6 6 6 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12  
## [265] 12 12 12 12 12 12 11 11 11 11 11 11 11 11 11 11 11 11 11 11 11 11 11 11  
## [289] 11 11 11 11 11 11 11 11 11 11 11 11 11 11 11 11 11 10 10 10 10 10 10 10  
## [313] 10 10 10 5 5 5 5 5 5 5 5 5 5 5 5 5 6 6 6 6 6 6 6 12  
## [337] 12 12 12 12 12 12 12 12 12 12 12 12 12 12 11 11 11 11 11 11 11 11 11 11  
## [361] 11 11 11 11 11 11 11 11 11 11 11 11 10 10 10 10 10 10 10 10 10 5 5 5  
## [385] 5 5 5 5 5 5 5 5 5 6 6 6 6 6 6 12 12 12 12 12 12 12 12 12  
## [409] 12 12 12 12 12 12 11 11 11 11 11 11 11 11 11 11 11 11 11 11 11 11 11 11  
## [433] 11 11 10 10 10 10 10 10 10 10 10 10 5 5 5 5 5 5 5 5 5 5 5 5  
## [457] 6 6 6 6 6 6 6 12 12 12 12 12 12 12 12 12 12 12 12 12 11 11 11 11  
## [481] 11 11 11 11 11 11 11 11 11 11 11 11 11 11 11 10 10 10 10 10 10 10 5 5  
## [505] 5 5 5 5 5 5 6 6 6 6 6 6 12 12 12 12 12 12 12 12 11 11 11 11  
## [529] 11 11 11 11 11 11 11 11 11 11 10 10 10 10 10 10 5 5 5 5 5 5 5 6  
## [553] 6 6 6 6 12 12 12 12 12 12 12 11 11 11 11 11 11 11 11 11 11 11 10 10  
## [577] 10 10 10 10 10 10 5 5 5 5 5 5 5 5 5 6 6 6 6 6 12 12 12 12  
## [601] 12 12 12 12 12 11 11 11 11 11 11 11 11 11 11 11 11 11 11 11 10 10 10 10  
## [625] 10 10 10 10 5 5 5 5 5 5 5 5 6 6 6 6 6 12 12 12 12 12 12 12  
## [649] 12 12 11 11 11 11 11 11 11 11 11 11 11 11 11 11 10 10 10 10 10 10 10 5  
## [673] 5 5 5 5 5 5 6 6 6 6 6 12 12 12 12 12 12 12 12 12 11 11 11 11  
## [697] 11 11 11 11 11 11 11 11 11 11 10 10 10 10 10 10 10 10 10 5 5 5 5 5  
## [721] 5 5 6 6 6 6 6 12 12 12 12 12 12 12 12 12 12 11 11 11 11 11 11 11  
## [745] 11 11 11 11 11 11 11 11 10 10 10 10 10 10 10 10 10 10 5 5 5 5 5 5  
## [769] 6 6 6 6 6 12 12 12 12 12 12 12 12 12 11 11 11 11 11 11 11 11 11 11  
## [793] 11 11 11 11 10 10 10 10 10 10 10 10 10 10 10 5 5 5 5 5 6 6 6 6  
## [817] 12 12 12 12 12 12 12 12 12 12 11 11 11 11 11 11 11 11 11 11 11 11 11 11  
## [841] 11 10 10 10 10 10 10 10 10 10 10 10 5 5 5 5 5 6 6 6 6 12 12 12  
## [865] 12 12 12 12 12 12 12 12 11 11 11 11 11 11 11 11 11 11 11 11 11 11 11 10  
## [889] 10 10 10 10 10 10 10 10 10 10 5 5 5 5 5 5 5 5 6 6 6 6 12 12  
## [913] 12 12 12 12 12 12 12 12 12 12 12 12 11 11 11 11 11 11 11 11 11 11 11 11  
## [937] 11 11 11 11 11 11 10 10 10 10 10 10 10 10 10 10 10 10 10 5 5 5 5 5  
## [961] 5 5 5 6 6 6 6 6 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 11  
## [985] 11 11 11 11 11 11 11 11 11 11 11 11 11 11 11 11 11 11 11 10 10 10 10 10  
## [1009] 10 10 10 10 10 10 10 5 5 5 5 5 5 5 5 6 6 6 12 12 12 12 12 12  
## [1033] 12 12 12 12 12 12 12 12 12 12 11 11 11 11 11 11 11 11 11 11 11 11 11 11  
## [1057] 11 11 11 11 11 10 10 10 10 10 10 10 10 10 10 10 10 5 5 5 5 5 5 5  
## [1081] 5 5 5 6 6 6 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 11 11  
## [1105] 11 11 11 11 11 11 11 11 11 11 11 11 11 11 11 11 11 11 10 10 10 10 10 10  
## [1129] 10 10 10 10 10 5 5 5 5 5 5 5 5 5 6 6 6 12 12 12 12 12 12 12  
## [1153] 12 12 12 12 12 12 12 12 12 12 11 11 11 11 11 11 11 11 11 11 11 11 11 11  
## [1177] 11 11 11 11 11 10 10 10 10 10 10 10 10 10 10 10 5 5 5 5 5 5 5 5  
## [1201] 6 6 6 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 11 11 11 11 11  
## [1225] 11 11 11 11 11 11 11 11 11 11 11 11 11 10 10 10 10 10 10 10 10 10 10 10  
## [1249] 10 5 5 5 5 5 5 5 6 6 12 12 12 12 12 12 12 12 12 12 12 12 12 12  
## [1273] 12 11 11 11 11 11 11 11 11 11 11 11 11 11 11 11 11 11 10 10 10 10 10 10  
## [1297] 10 10 10 10 10 10 10 5 5 5 5 5 5 5 5 5 5 6 6 12 12 12 12 12  
## [1321] 12 12 12 12 12 12 12 12 12 12 12 12 12 12 12 11 11 11 11 11 11 11 11 11  
## [1345] 11 11 11 11 11 11 11 11 11 11 11 11 11 10 10 10 10 10 10 10 10 10 10 10  
## [1369] 10 10 5 5 5 5 5 5 5 5 5 5 6 6 6 12 12 12 12 12 12 12 12 12  
## [1393] 12 12 12 12 12 12 12 12 12 12 12 11 11 11 11 11 11 11 11 11 11 11 11 11  
## [1417] 11 11 11 11 11 11 11 11 11 10 4 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [1441] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [1465] 4 4 4 4 4 4 4 4 4 8 4 4 4 4 4 4 4 8 4 4 4 4 4 4  
## [1489] 4 4 4 4 4 4 4 4 4 4 4 4 8 8 4 4 4 4 4 4 4 4 4 4  
## [1513] 4 4 4 4 4 4 4 8 8 8 4 4 4 4 4 4 4 4 4 4 4 4 4 4  
## [1537] 4 4 4 8 8 8 8 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 8  
## [1561] 8 8 8 4 4 4 4 4 4 4 4 4 4 4 4 4 4 1 8 8 8 8 4 4  
## [1585] 4 4 4 4 4 4 4 4 4 1 1 1 8 8 8 8 4 4 4 4 4 4 4 1  
## [1609] 1 1 1 1 1 8 8 8 8 8 8 8 8 4 4 4 1 1 1 8 8 8 8 8  
## [1633] 8 8 8 8 8 1 1 1 1 1 1 1 8 8 8 8 8 8 8 8 8 1 1 1  
## [1657] 1 1 1 1 8 8 8 8 8 8 8 8 8 8 8 8 8 1 1 1 1 8 8 8  
## [1681] 8 8 8 8 8 8 1 1 1 1 8 8 8 8 8 8 8 8 1 1 1 1 1 1  
## [1705] 8 8 8 8 8 8 8 1 1 1 1 1 1 8 8 8 1 1 1 8 8 8 8 8  
## [1729] 1 1 1 8 8 8 8 8 1 1 1 8 8 8 8 8 1 1 1 8 8 8 8 8  
## [1753] 1 1 1 1 1 8 8 8 8 8 1 1 8 8 8 9 9 9 9 9 9 9 9 9  
## [1777] 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9  
## [1801] 9 9 9 9 9 9 9 9 9 7 9 9 9 9 9 9 9 9 9 9 9 9 9 9  
## [1825] 9 9 9 9 9 9 9 9 9 9 7 2 2 2 2 2 2 9 9 9 9 9 9 9  
## [1849] 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 7 7 7 7 7 7 7  
## [1873] 7 2 2 2 2 2 2 2 2 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9  
## [1897] 9 9 9 9 9 9 9 9 7 7 7 7 7 7 2 2 2 2 2 2 2 2 2 2  
## [1921] 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9  
## [1945] 7 7 7 7 7 7 2 2 2 2 2 2 2 2 2 2 2 2 2 9 9 9 9 9  
## [1969] 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 7 7 7 7 7  
## [1993] 7 7 7 7 7 2 2 2 2 2 2 2 2 2 2 2 2 2 9 9 9 9 9 9  
## [2017] 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 7 7 7 7 7 7  
## [2041] 7 7 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 9 9 9 9 9  
## [2065] 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 7 7 7 7 7 7  
## [2089] 7 7 7 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 9 9 9  
## [2113] 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 7 7 7  
## [2137] 7 7 7 7 7 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [2161] 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9  
## [2185] 9 9 9 9 9 7 7 7 7 7 7 7 7 7 2 2 2 2 2 2 2 2 2 2  
## [2209] 2 2 2 2 2 2 2 2 2 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9  
## [2233] 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 7 7 7 7 7 7 7 7 7  
## [2257] 7 7 7 7 7 3 3 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [2281] 2 2 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9  
## [2305] 9 9 9 9 9 9 9 9 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7  
## [2329] 3 3 3 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 9 9  
## [2353] 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9  
## [2377] 9 9 9 9 9 9 9 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 3 3  
## [2401] 3 3 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 9  
## [2425] 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9  
## [2449] 9 9 9 9 9 9 9 9 9 9 9 7 7 7 7 7 7 7 7 7 7 7 7 7  
## [2473] 7 7 7 7 3 3 3 3 3 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [2497] 2 2 2 2 2 2 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9  
## [2521] 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 7 7 7 7 7  
## [2545] 7 7 7 7 7 7 7 7 7 7 7 3 3 3 3 3 2 2 2 2 2 2 2 2  
## [2569] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 9 9 9 9 9 9 9 9  
## [2593] 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9  
## [2617] 9 9 9 9 9 9 9 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7  
## [2641] 7 7 3 3 3 3 3 3 3 3 3 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [2665] 2 2 2 2 2 2 2 2 2 2 2 2 2 9 9 9 9 9 9 9 9 9 9 9  
## [2689] 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9  
## [2713] 9 9 9 9 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 3 3  
## [2737] 3 3 3 3 3 3 3 3 3 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [2761] 2 2 2 2 2 2 2 2 2 2 2 9 9 9 9 9 9 9 9 9 9 9 9 9  
## [2785] 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9  
## [2809] 9 9 7 7 7 7 7 7 7 7 7 7 3 3 3 3 3 3 3 3 3 3 3 2  
## [2833] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [2857] 2 2 2 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9  
## [2881] 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 7 7 7 7  
## [2905] 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 3 3 3 3 3 3 3  
## [2929] 3 3 3 3 3 3 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [2953] 2 2 2 2 2 2 2 2 2 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9  
## [2977] 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9  
## [3001] 9 9 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7  
## [3025] 7 3 3 3 3 3 3 3 3 3 3 3 3 3 2 2 2 2 2 2 2 2 2 2  
## [3049] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 9 9 9 9  
## [3073] 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9  
## [3097] 9 9 9 9 9 9 9 9 9 9 9 9 9 9 7 7 7 7 7 7 7 7 7 7  
## [3121] 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 3 3 3 3 3  
## [3145] 3 3 3 3 3 3 3 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [3169] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 9 9 9 9 9 9 9 9 9 9  
## [3193] 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9  
## [3217] 9 9 9 9 9 9 9 9 9 9 9 7 7 7 7 7 7 7 7 7 7 7 7 7  
## [3241] 7 7 7 7 7 7 7 7 7 7 7 7 7 7 3 3 3 3 3 3 3 3 3 3  
## [3265] 3 3 3 3 3 3 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [3289] 2 2 2 2 2 2 2 2 2 2 2 2 2 9 9 9 9 9 9 9 9 9 9 9  
## [3313] 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9  
## [3337] 9 9 9 9 9 9 9 9 9 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7  
## [3361] 7 7 7 7 7 7 7 7 7 7 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [3385] 3 3 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [3409] 2 2 2 2 2 2 2 2 2 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9  
## [3433] 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9  
## [3457] 9 9 9 9 9 9 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7  
## [3481] 7 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 2 2 2 2 2 2 2  
## [3505] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [3529] 2 2 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9  
## [3553] 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9  
## [3577] 9 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7  
## [3601] 7 7 7 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 2 2  
## [3625] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [3649] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 9 9 9 9 9 9 9 9 9  
## [3673] 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9  
## [3697] 9 9 9 9 9 9 9 9 9 9 9 9 9 9 7 7 7 7 7 7 7 7 7 7  
## [3721] 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7  
## [3745] 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 3 3 3 3 3 3 3 3 3  
## [3769] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [3793] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [3817] 3 3 3 3 3 3 3 3 3 3 3 3 2 2 2 2 2 2 2 2 2 2 2 2  
## [3841] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2  
## [3865] 2 2 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9  
## [3889] 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 7 7 7 7 7 7 7  
## [3913] 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7  
## [3937] 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7  
## [3961] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [3985] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
## [4009] 3 3 3 3 3 3 3 3 3 3 3 3 3 3  
##   
## Within cluster sum of squares by cluster:  
## [1] 1914.939 75619.599 160239.556 6158.459 13150.819 26556.346  
## [7] 174149.806 3962.288 181245.940 14553.046 58500.610 41362.846  
## (between\_SS / total\_SS = 97.4 %)  
##   
## Available components:  
##   
## [1] "cluster" "centers" "totss" "withinss" "tot.withinss"  
## [6] "betweenss" "size" "iter" "ifault"



## Answer 3

1. Below are the results for answer 3. These results include the distances requested as well as the average of these distances. There is also a line plot created from this information that helped determine the elbow point. Looking at the graph creating the elbow point would be where k=3 and the average distance is around 88.69. This is where the graph changes shape and has an inflection point.

## Metric: 'euclidean'; comparing: 2 vectors.

## euclidean   
## 151.1523

## Metric: 'euclidean'; comparing: 3 vectors.

## v1 v2 v3  
## v1 0.0000 155.26329 155.67277  
## v2 155.2633 0.00000 88.16222  
## v3 155.6728 88.16222 0.00000

## Metric: 'euclidean'; comparing: 4 vectors.

## v1 v2 v3 v4  
## v1 0.00000 88.93857 135.89703 187.84577  
## v2 88.93857 0.00000 142.80910 171.09404  
## v3 135.89703 142.80910 0.00000 59.33345  
## v4 187.84577 171.09404 59.33345 0.00000

## Metric: 'euclidean'; comparing: 5 vectors.

## v1 v2 v3 v4 v5  
## v1 0.00000 72.46763 207.58334 77.50881 206.75345  
## v2 72.46763 0.00000 135.24745 69.06147 142.17903  
## v3 207.58334 135.24745 0.00000 178.34938 88.93857  
## v4 77.50881 69.06147 178.34938 0.00000 147.60409  
## v5 206.75345 142.17903 88.93857 147.60409 0.00000

## Metric: 'euclidean'; comparing: 6 vectors.

## v1 v2 v3 v4 v5 v6  
## v1 0.00000 50.57488 62.70235 150.01441 36.12113 170.09833  
## v2 50.57488 0.00000 72.46763 142.17903 83.95587 135.24745  
## v3 62.70235 72.46763 0.00000 206.75345 90.45351 207.58334  
## v4 150.01441 142.17903 206.75345 0.00000 147.65236 88.93857  
## v5 36.12113 83.95587 90.45351 147.65236 0.00000 186.01227  
## v6 170.09833 135.24745 207.58334 88.93857 186.01227 0.00000

## Metric: 'euclidean'; comparing: 7 vectors.

## v1 v2 v3 v4 v5 v6 v7  
## v1 0.00000 158.50217 207.74883 58.52733 78.58338 90.48355 224.99034  
## v2 158.50217 0.00000 96.04528 100.49028 135.57132 68.39185 66.82228  
## v3 207.74883 96.04528 0.00000 154.15923 147.63562 129.23527 92.40959  
## v4 58.52733 100.49028 154.15923 0.00000 63.46809 32.13102 166.65798  
## v5 78.58338 135.57132 147.63562 63.46809 0.00000 79.22575 193.39415  
## v6 90.48355 68.39185 129.23527 32.13102 79.22575 0.00000 134.55127  
## v7 224.99034 66.82228 92.40959 166.65798 193.39415 134.55127 0.00000

## Metric: 'euclidean'; comparing: 8 vectors.

## v1 v2 v3 v4 v5 v6 v7  
## v1 0.00000 166.20044 66.82228 185.38540 224.99034 134.25943 92.40959  
## v2 166.20044 0.00000 99.97904 43.50325 58.91683 31.94474 154.20159  
## v3 66.82228 99.97904 0.00000 123.96969 158.50217 68.10694 96.04528  
## v4 185.38540 43.50325 123.96969 0.00000 63.38067 62.30207 150.01441  
## v5 224.99034 58.91683 158.50217 63.38067 0.00000 90.77745 207.74883  
## v6 134.25943 31.94474 68.10694 62.30207 90.77745 0.00000 128.97807  
## v7 92.40959 154.20159 96.04528 150.01441 207.74883 128.97807 0.00000  
## v8 200.07337 79.08578 144.94184 36.12113 90.78965 92.32998 147.65236  
## v8  
## v1 200.07337  
## v2 79.08578  
## v3 144.94184  
## v4 36.12113  
## v5 90.78965  
## v6 92.32998  
## v7 147.65236  
## v8 0.00000

## Metric: 'euclidean'; comparing: 9 vectors.

## v1 v2 v3 v4 v5 v6 v7  
## v1 0.00000 66.24192 85.75778 166.47201 134.46093 200.32321 104.36951  
## v2 66.24192 0.00000 107.46829 100.83257 68.88549 145.64127 91.00689  
## v3 85.75778 107.46829 0.00000 177.75554 150.70475 174.75048 51.54757  
## v4 166.47201 100.83257 177.75554 0.00000 32.01543 79.08539 134.07954  
## v5 134.46093 68.88549 150.70475 32.01543 0.00000 92.39778 111.31312  
## v6 200.32321 145.64127 174.75048 79.08539 92.39778 0.00000 123.22603  
## v7 104.36951 91.00689 51.54757 134.07954 111.31312 123.22603 0.00000  
## v8 225.28290 159.37893 232.75568 58.93721 90.86674 90.78965 185.71021  
## v9 185.65864 124.76783 176.27317 43.50506 62.38420 36.12113 126.64817  
## v8 v9  
## v1 225.28290 185.65864  
## v2 159.37893 124.76783  
## v3 232.75568 176.27317  
## v4 58.93721 43.50506  
## v5 90.86674 62.38420  
## v6 90.78965 36.12113  
## v7 185.71021 126.64817  
## v8 0.00000 63.38067  
## v9 63.38067 0.00000

## Metric: 'euclidean'; comparing: 10 vectors.

## v1 v2 v3 v4 v5 v6 v7  
## v1 0.00000 75.21175 50.81078 60.07633 65.73388 131.43838 150.01441  
## v2 75.21175 0.00000 29.40573 95.25637 111.18364 61.05020 119.27571  
## v3 50.81078 29.40573 0.00000 66.78117 82.16349 90.41431 138.41581  
## v4 60.07633 95.25637 66.78117 0.00000 17.52851 155.91280 200.12780  
## v5 65.73388 111.18364 82.16349 17.52851 0.00000 172.12481 211.69944  
## v6 131.43838 61.05020 90.41431 155.91280 172.12481 0.00000 93.58851  
## v7 150.01441 119.27571 138.41581 200.12780 211.69944 93.58851 0.00000  
## v8 186.71349 120.61383 149.72365 215.79827 231.78687 60.10161 92.75594  
## v9 43.91033 52.18192 23.37281 43.40837 59.00301 113.16459 159.55694  
## v10 36.12113 102.66315 83.33907 90.77454 91.32298 151.51878 147.65236  
## v8 v9 v10  
## v1 186.71349 43.91033 36.12113  
## v2 120.61383 52.18192 102.66315  
## v3 149.72365 23.37281 83.33907  
## v4 215.79827 43.40837 90.77454  
## v5 231.78687 59.00301 91.32298  
## v6 60.10161 113.16459 151.51878  
## v7 92.75594 159.55694 147.65236  
## v8 0.00000 172.78504 201.28604  
## v9 172.78504 0.00000 79.91508  
## v10 201.28604 79.91508 0.00000

## Metric: 'euclidean'; comparing: 11 vectors.

## v1 v2 v3 v4 v5 v6 v7  
## v1 0.00000 140.08983 29.38692 103.88304 78.86574 52.48716 105.57858  
## v2 140.08983 0.00000 161.65595 51.54757 184.61288 184.11322 233.00567  
## v3 29.38692 161.65595 0.00000 119.62672 52.60526 23.78640 76.73554  
## v4 103.88304 51.54757 119.62672 0.00000 135.15330 140.19321 185.93959  
## v5 78.86574 184.61288 52.60526 135.15330 0.00000 42.20332 55.30807  
## v6 52.48716 184.11322 23.78640 140.19321 42.20332 0.00000 53.11099  
## v7 105.57858 233.00567 76.73554 185.93959 55.30807 53.11099 0.00000  
## v8 102.34811 174.75048 83.04531 123.22603 40.31044 80.13869 90.85300  
## v9 120.86197 85.71200 149.93882 104.75355 192.93593 173.34352 226.44046  
## v10 60.43885 104.22495 89.78044 90.72483 135.99200 112.84309 165.83961  
## v11 72.38231 170.33919 49.73932 120.58902 14.76824 46.38593 69.46446  
## v8 v9 v10 v11  
## v1 102.34811 120.86197 60.43885 72.38231  
## v2 174.75048 85.71200 104.22495 170.33919  
## v3 83.04531 149.93882 89.78044 49.73932  
## v4 123.22603 104.75355 90.72483 120.58902  
## v5 40.31044 192.93593 135.99200 14.76824  
## v6 80.13869 173.34352 112.84309 46.38593  
## v7 90.85300 226.44046 165.83961 69.46446  
## v8 0.00000 201.05103 150.59459 34.16251  
## v9 201.05103 0.00000 60.95844 181.94016  
## v10 150.59459 60.95844 0.00000 126.60632  
## v11 34.16251 181.94016 126.60632 0.00000

## Metric: 'euclidean'; comparing: 12 vectors.

## v1 v2 v3 v4 v5 v6 v7  
## v1 0.00000 65.70480 166.81371 11.54115 42.27939 111.02299 61.41501  
## v2 65.70480 0.00000 214.27642 69.66157 95.13323 176.01167 100.24308  
## v3 166.81371 214.27642 0.00000 173.80078 184.99172 109.30615 114.05245  
## v4 11.54115 69.66157 173.80078 0.00000 31.39528 110.67472 71.69059  
## v5 42.27939 95.13323 184.99172 31.39528 0.00000 103.42764 95.71924  
## v6 111.02299 176.01167 109.30615 110.67472 103.42764 0.00000 101.94499  
## v7 61.41501 100.24308 114.05245 71.69059 95.71924 101.94499 0.00000  
## v8 16.29343 53.92288 182.75203 15.83829 43.55150 125.65948 75.01228  
## v9 37.23408 61.69640 152.73974 48.70129 79.25807 124.29990 38.71971  
## v10 43.58288 87.28190 196.11321 32.04530 13.38500 116.77698 101.92310  
## v11 170.69078 233.07566 86.29119 172.29938 168.17983 65.05782 143.94680  
## v12 128.00556 191.84623 94.45581 128.80978 123.82836 21.23737 109.96185  
## v8 v9 v10 v11 v12  
## v1 16.29343 37.23408 43.58288 170.69078 128.00556  
## v2 53.92288 61.69640 87.28190 233.07566 191.84623  
## v3 182.75203 152.73974 196.11321 86.29119 94.45581  
## v4 15.83829 48.70129 32.04530 172.29938 128.80978  
## v5 43.55150 79.25807 13.38500 168.17983 123.82836  
## v6 125.65948 124.29990 116.77698 65.05782 21.23737  
## v7 75.01228 38.71971 101.92310 143.94680 109.96185  
## v8 0.00000 44.50365 39.73661 186.32963 143.26895  
## v9 44.50365 0.00000 80.58839 175.54532 136.99890  
## v10 39.73661 80.58839 0.00000 181.46752 137.11179  
## v11 186.32963 175.54532 181.46752 0.00000 44.35601  
## v12 143.26895 136.99890 137.11179 44.35601 0.00000

## [1] 151.1523

## [1] 88.68851

## [1] 98.23974

## [1] 106.0555

## [1] 101.7086

## [1] 101.1847

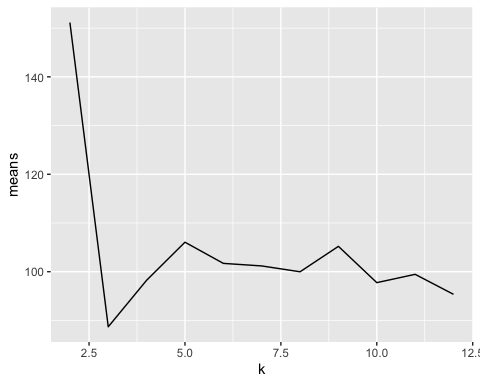
## [1] 99.98227

## [1] 105.2048

## [1] 97.75367

## [1] 99.4607

## [1] 95.35399



## k means  
## 1 2 151.15225  
## 2 3 88.68851  
## 3 4 98.23974  
## 4 5 106.05546  
## 5 6 101.70859  
## 6 7 101.18468  
## 7 8 99.98227  
## 8 9 105.20483  
## 9 10 97.75367  
## 10 11 99.46070  
## 11 12 95.35399