> kmeans(iris\_copy,2)

K-means clustering with 2 clusters of sizes 53, 97

Cluster means:

Sepal.Length Sepal.Width Petal.Length Petal.Width

1 5.005660 3.369811 1.560377 0.290566

2 6.301031 2.886598 4.958763 1.695876

Clustering vector:

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18

1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36

1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54

1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 2 2 2

55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72

2 2 2 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2

73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90

2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2

91 92 93 94 95 96 97 98 99 100 101 102 103 104 105 106 107 108

2 2 2 1 2 2 2 2 1 2 2 2 2 2 2 2 2 2

109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126

2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2

127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144

2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2

145 146 147 148 149 150

2 2 2 2 2 2

Within cluster sum of squares by cluster:

[1] 28.55208 123.79588

(between\_SS / total\_SS = 77.6 %)

Available components:

[1] "cluster" "centers" "totss" "withinss"

[5] "tot.withinss" "betweenss" "size" "iter"

[9] "ifault"

kmeans(iris\_copy,3)

K-means clustering with 3 clusters of sizes 50, 62, 38

Cluster means:

Sepal.Length Sepal.Width Petal.Length Petal.Width

1 5.006000 3.428000 1.462000 0.246000

2 5.901613 2.748387 4.393548 1.433871

3 6.850000 3.073684 5.742105 2.071053

Clustering vector:

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21

1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42

1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63

1 1 1 1 1 1 1 1 2 2 3 2 2 2 2 2 2 2 2 2 2

64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84

2 2 2 2 2 2 2 2 2 2 2 2 2 2 3 2 2 2 2 2 2

85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105

2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 3 2 3 3 3

106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126

3 2 3 3 3 3 3 3 2 2 3 3 3 3 2 3 2 3 2 3 3

127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146 147

2 2 3 3 3 3 3 2 3 3 3 3 2 3 3 3 2 3 3 3 2

148 149 150

3 3 2

Within cluster sum of squares by cluster:

[1] 15.15100 39.82097 23.87947

(between\_SS / total\_SS = 88.4 %)

Available components:

[1] "cluster" "centers" "totss" "withinss" "tot.withinss"

[6] "betweenss" "size" "iter" "ifault"

means(iris\_copy,4)

K-means clustering with 4 clusters of sizes 22, 62, 38, 28

Cluster means:

Sepal.Length Sepal.Width Petal.Length Petal.Width

1 4.704545 3.122727 1.413636 0.2000000

2 5.901613 2.748387 4.393548 1.4338710

3 6.850000 3.073684 5.742105 2.0710526

4 5.242857 3.667857 1.500000 0.2821429

Clustering vector:

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21

4 1 1 1 4 4 1 4 1 1 4 1 1 1 4 4 4 4 4 4 4

22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42

4 1 4 1 1 4 4 4 1 1 4 4 4 1 1 4 4 1 4 4 1

43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63

1 4 4 1 4 1 4 1 2 2 3 2 2 2 2 2 2 2 2 2 2

64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84

2 2 2 2 2 2 2 2 2 2 2 2 2 2 3 2 2 2 2 2 2

85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105

2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 3 2 3 3 3

106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126

3 2 3 3 3 3 3 3 2 2 3 3 3 3 2 3 2 3 2 3 3

127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146 147

2 2 3 3 3 3 3 2 3 3 3 3 2 3 3 3 2 3 3 3 2

148 149 150

3 3 2

Within cluster sum of squares by cluster:

[1] 3.114091 39.820968 23.879474 4.630714

(between\_SS / total\_SS = 89.5 %)

Available components:

[1] "cluster" "centers" "totss" "withinss" "tot.withinss"

[6] "betweenss" "size" "iter" "ifault"

> kmeans(iris\_copy,5)

K-means clustering with 5 clusters of sizes 24, 12, 50, 39, 25

Cluster means:

Sepal.Length Sepal.Width Petal.Length Petal.Width

1 6.529167 3.058333 5.508333 2.162500

2 7.475000 3.125000 6.300000 2.050000

3 5.006000 3.428000 1.462000 0.246000

4 6.207692 2.853846 4.746154 1.564103

5 5.508000 2.600000 3.908000 1.204000

Clustering vector:

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3

25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48

3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3

49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72

3 3 4 4 4 5 4 4 4 5 4 5 5 4 5 4 5 4 4 5 4 5 4 5

73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96

4 4 4 4 4 4 4 5 5 5 5 4 5 4 4 4 5 5 5 4 5 5 5 5

97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120

5 4 5 5 1 4 2 1 1 2 5 2 1 2 1 1 1 4 1 1 1 2 2 4

121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144

1 4 2 4 1 2 4 4 1 2 2 2 1 4 4 2 1 1 4 1 1 1 4 1

145 146 147 148 149 150

1 1 4 1 1 4

Within cluster sum of squares by cluster:

[1] 5.46250 4.65500 15.15100 12.81128 8.36640

(between\_SS / total\_SS = 93.2 %)

Available components:

[1] "cluster" "centers" "totss" "withinss" "tot.withinss" "betweenss"

[7] "size" "iter" "ifault"

> kmeans(iris\_copy,7)

K-means clustering with 7 clusters of sizes 22, 24, 20, 12, 28, 21, 23

Cluster means:

Sepal.Length Sepal.Width Petal.Length Petal.Width

1 4.704545 3.122727 1.413636 0.2000000

2 5.512500 2.583333 3.883333 1.1916667

3 6.415000 2.980000 4.575000 1.4350000

4 7.475000 3.125000 6.300000 2.0500000

5 5.242857 3.667857 1.500000 0.2821429

6 5.952381 2.738095 4.914286 1.7238095

7 6.560870 3.069565 5.526087 2.1521739

Clustering vector:

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

5 1 1 1 5 5 1 5 1 1 5 1 1 1 5 5 5 5 5 5 5 5 1 5

25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48

1 1 5 5 5 1 1 5 5 5 1 1 5 5 1 5 5 1 1 5 5 1 5 1

49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72

5 1 3 3 3 2 3 6 3 2 3 2 2 3 2 3 2 3 6 2 6 2 6 2

73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96

6 3 3 3 3 3 3 2 2 2 2 6 6 3 3 3 2 2 2 3 2 2 2 2

97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120

2 3 2 2 7 6 4 7 7 4 2 4 7 4 7 7 7 6 6 7 7 4 4 6

121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144

7 6 4 6 7 4 6 6 7 4 4 4 7 6 6 4 7 7 6 7 7 7 6 7

145 146 147 148 149 150

7 7 6 7 7 6

Within cluster sum of squares by cluster:

[1] 3.114091 7.731250 4.140500 4.655000 4.630714 5.525714 4.605217

(between\_SS / total\_SS = 95.0 %)

Available components:

[1] "cluster" "centers" "totss" "withinss" "tot.withinss" "betweenss"

[7] "size" "iter" "ifault"

-means clustering with 9 clusters of sizes 10, 12, 21, 36, 7, 16, 7, 17, 24

Cluster means:

Sepal.Length Sepal.Width Petal.Length Petal.Width

1 5.260000 3.630000 1.550000 0.2700000

2 7.475000 3.125000 6.300000 2.0500000

3 5.628571 2.723810 4.133333 1.2952381

4 6.247222 2.847222 4.775000 1.5750000

5 5.242857 2.371429 3.442857 1.0285714

6 4.668750 3.025000 1.412500 0.1937500

7 5.528571 4.042857 1.471429 0.2857143

8 4.958824 3.435294 1.452941 0.2647059

9 6.529167 3.058333 5.508333 2.1625000

Clustering vector:

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

8 6 6 6 8 7 8 8 6 6 1 8 6 6 7 7 7 8 7 1 1 1 8 8

25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48

8 6 8 1 8 6 6 1 7 7 6 8 1 8 6 8 8 6 6 8 1 6 1 6

49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72

1 8 4 4 4 3 4 3 4 5 4 3 5 3 3 4 3 4 3 3 4 3 4 3

73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96

4 4 4 4 4 4 4 5 5 5 3 4 3 4 4 4 3 3 3 4 3 5 3 3

97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120

3 4 5 3 9 4 2 9 9 2 3 2 9 2 9 9 9 4 9 9 9 2 2 4

121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144

9 4 2 4 9 2 4 4 9 2 2 2 9 4 4 2 9 9 4 9 9 9 4 9

145 146 147 148 149 150

9 9 4 9 9 4

Within cluster sum of squares by cluster:

[1] 0.7710000 4.6550000 4.1771429 11.4544444 1.2628571 1.7312500 0.8342857 1.5611765

[9] 5.4625000

(between\_SS / total\_SS = 95.3 %)

Available components:

[1] "cluster" "centers" "totss" "withinss" "tot.withinss" "betweenss"

[7] "size" "iter" "ifault"

> kmeans(iris\_copy,11)

K-means clustering with 11 clusters of sizes 7, 17, 20, 11, 6, 21, 5, 24, 23, 12, 4

Cluster means:

Sepal.Length Sepal.Width Petal.Length Petal.Width

1 5.528571 4.042857 1.471429 0.2857143

2 5.170588 3.552941 1.464706 0.2352941

3 6.415000 2.980000 4.575000 1.4350000

4 4.854545 3.100000 1.463636 0.1909091

5 4.966667 3.466667 1.716667 0.3833333

6 5.952381 2.738095 4.914286 1.7238095

7 4.580000 3.320000 1.280000 0.2200000

8 5.512500 2.583333 3.883333 1.1916667

9 6.560870 3.069565 5.526087 2.1521739

10 7.475000 3.125000 6.300000 2.0500000

11 4.400000 2.800000 1.275000 0.2000000

Clustering vector:

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

2 4 7 4 2 1 7 2 11 4 2 5 4 11 1 1 1 2 1 2 2 2 7 5

25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48

5 4 5 2 2 4 4 2 1 1 4 4 2 2 11 2 2 11 7 5 5 4 2 7

49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72

2 4 3 3 3 8 3 6 3 8 3 8 8 3 8 3 8 3 6 8 6 8 6 8

73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96

6 3 3 3 3 3 3 8 8 8 8 6 6 3 3 3 8 8 8 3 8 8 8 8

97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120

8 3 8 8 9 6 10 9 9 10 8 10 9 10 9 9 9 6 6 9 9 10 10 6

121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144

9 6 10 6 9 10 6 6 9 10 10 10 9 6 6 10 9 9 6 9 9 9 6 9

145 146 147 148 149 150

9 9 6 9 9 6

Within cluster sum of squares by cluster:

[1] 0.8342857 1.0552941 4.1405000 0.4418182 0.4833333 5.5257143 0.2920000 7.7312500 4.6052174

[10] 4.6550000 0.4275000

(between\_SS / total\_SS = 95.6 %)

Available components:

[1] "cluster" "centers" "totss" "withinss" "tot.withinss" "betweenss"

[7] "size" "iter" "ifault"