

# Assignment 5

Khutso Ledwaba

2022-12-01

#Calling the cereals data file and organization

```
Cereals <- read.csv(file = 'Cereals.csv')  
Cereals
```

	name	mfr	type	calories	protein	fat	sodium
## 1	100%_Bran	N	C	70	4	1	130
## 2	100%_Natural_Bran	Q	C	120	3	5	15
## 3	All-Bran	K	C	70	4	1	260
## 4	All-Bran_with_Extra_Fiber	K	C	50	4	0	140
## 5	Almond_Delight	R	C	110	2	2	200
## 6	Apple_Cinnamon_Cheerios	G	C	110	2	2	180
## 7	Apple_Jacks	K	C	110	2	0	125
## 8	Basic_4	G	C	130	3	2	210
## 9	Bran_Chex	R	C	90	2	1	200
## 10	Bran_Flakes	P	C	90	3	0	210
## 11	Cap'n'Crunch	Q	C	120	1	2	220
## 12	Cheerios	G	C	110	6	2	290
## 13	Cinnamon_Toast_Crunch	G	C	120	1	3	210
## 14	Clusters	G	C	110	3	2	140
## 15	Cocoa_Puffs	G	C	110	1	1	180
## 16	Corn_Chex	R	C	110	2	0	280
## 17	Corn_Flakes	K	C	100	2	0	290
## 18	Corn_Pops	K	C	110	1	0	90
## 19	Count_Chocula	G	C	110	1	1	180
## 20	Cracklin'_Oat_Bran	K	C	110	3	3	140
## 21	Cream_of_Wheat_(Quick)	N	H	100	3	0	80
## 22	Crispix	K	C	110	2	0	220
## 23	Crispy_Wheat_&_Raisins	G	C	100	2	1	140
## 24	Double_Chex	R	C	100	2	0	190
## 25	Froot_Loops	K	C	110	2	1	125
## 26	Frosted_Flakes	K	C	110	1	0	200
## 27	Frosted_Mini-Wheats	K	C	100	3	0	0
## 28	Fruit_&_Fibre_Dates,_Walnuts,_and_Oats	P	C	120	3	2	160
## 29	Fruitful_Bran	K	C	120	3	0	240
## 30	Fruity_Pebbles	P	C	110	1	1	135
## 31	Golden_Crisp	P	C	100	2	0	45
## 32	Golden_Grahams	G	C	110	1	1	280
## 33	Grape_Nuts_Flakes	P	C	100	3	1	140
## 34	Grape-Nuts	P	C	110	3	0	170
## 35	Great_Grains_Pecan	P	C	120	3	3	75

## 36	Honey_Graham_Ohs	Q	C	120	1	2	220
## 37	Honey_Nut_Cheerios	G	C	110	3	1	250
## 38	Honey-comb	P	C	110	1	0	180
## 39	Just_Right_Crunchy__Nuggets	K	C	110	2	1	170
## 40	Just_Right_Fruit_&_Nut	K	C	140	3	1	170
## 41	Kix	G	C	110	2	1	260
## 42	Life	Q	C	100	4	2	150
## 43	Lucky_Charms	G	C	110	2	1	180
## 44	Maypo	A	H	100	4	1	0
## 45	Muesli_Raisins,_Dates,_&_Almonds	R	C	150	4	3	95
## 46	Muesli_Raisins,_Peaches,_&_Pecans	R	C	150	4	3	150
## 47	Mueslix_Crispy_Blend	K	C	160	3	2	150
## 48	Multi-Grain_Cheerios	G	C	100	2	1	220
## 49	Nut&Honey_Crunch	K	C	120	2	1	190
## 50	Nutri-Grain_Almond-Raisin	K	C	140	3	2	220
## 51	Nutri-grain_Wheat	K	C	90	3	0	170
## 52	Oatmeal_Raisin_Crisp	G	C	130	3	2	170
## 53	Post_Nat._Raisin_Bran	P	C	120	3	1	200
## 54	Product_19	K	C	100	3	0	320
## 55	Puffed_Rice	Q	C	50	1	0	0
## 56	Puffed_Wheat	Q	C	50	2	0	0
## 57	Quaker_Oat_Squares	Q	C	100	4	1	135
## 58	Quaker_Oatmeal	Q	H	100	5	2	0
## 59	Raisin_Bran	K	C	120	3	1	210
## 60	Raisin_Nut_Bran	G	C	100	3	2	140
## 61	Raisin_Squares	K	C	90	2	0	0
## 62	Rice_Chex	R	C	110	1	0	240
## 63	Rice_Krispies	K	C	110	2	0	290
## 64	Shredded_Wheat	N	C	80	2	0	0
## 65	Shredded_Wheat_'n'Bran	N	C	90	3	0	0
## 66	Shredded_Wheat_spoon_size	N	C	90	3	0	0
## 67	Smacks	K	C	110	2	1	70
## 68	Special_K	K	C	110	6	0	230
## 69	Strawberry_Fruit_Wheats	N	C	90	2	0	15
## 70	Total_Corn_Flakes	G	C	110	2	1	200
## 71	Total_Raisin_Bran	G	C	140	3	1	190
## 72	Total_Whole_Grain	G	C	100	3	1	200
## 73	Triples	G	C	110	2	1	250
## 74	Trix	G	C	110	1	1	140
## 75	Wheat_Chex	R	C	100	3	1	230
## 76	Wheaties	G	C	100	3	1	200
## 77	Wheaties_Honey_Gold	G	C	110	2	1	200

##	fiber	carbo	sugars	potass	vitamins	shelf	weight	cups	rating
## 1	10.0	5.0	6	280	25	3	1.00	0.33	68.40297
## 2	2.0	8.0	8	135	0	3	1.00	1.00	33.98368
## 3	9.0	7.0	5	320	25	3	1.00	0.33	59.42551
## 4	14.0	8.0	0	330	25	3	1.00	0.50	93.70491
## 5	1.0	14.0	8	NA	25	3	1.00	0.75	34.38484
## 6	1.5	10.5	10	70	25	1	1.00	0.75	29.50954
## 7	1.0	11.0	14	30	25	2	1.00	1.00	33.17409
## 8	2.0	18.0	8	100	25	3	1.33	0.75	37.03856
## 9	4.0	15.0	6	125	25	1	1.00	0.67	49.12025
## 10	5.0	13.0	5	190	25	3	1.00	0.67	53.31381
## 11	0.0	12.0	12	35	25	2	1.00	0.75	18.04285

## 12	2.0	17.0	1	105	25	1	1.00	1.25	50.76500
## 13	0.0	13.0	9	45	25	2	1.00	0.75	19.82357
## 14	2.0	13.0	7	105	25	3	1.00	0.50	40.40021
## 15	0.0	12.0	13	55	25	2	1.00	1.00	22.73645
## 16	0.0	22.0	3	25	25	1	1.00	1.00	41.44502
## 17	1.0	21.0	2	35	25	1	1.00	1.00	45.86332
## 18	1.0	13.0	12	20	25	2	1.00	1.00	35.78279
## 19	0.0	12.0	13	65	25	2	1.00	1.00	22.39651
## 20	4.0	10.0	7	160	25	3	1.00	0.50	40.44877
## 21	1.0	21.0	0	NA	0	2	1.00	1.00	64.53382
## 22	1.0	21.0	3	30	25	3	1.00	1.00	46.89564
## 23	2.0	11.0	10	120	25	3	1.00	0.75	36.17620
## 24	1.0	18.0	5	80	25	3	1.00	0.75	44.33086
## 25	1.0	11.0	13	30	25	2	1.00	1.00	32.20758
## 26	1.0	14.0	11	25	25	1	1.00	0.75	31.43597
## 27	3.0	14.0	7	100	25	2	1.00	0.80	58.34514
## 28	5.0	12.0	10	200	25	3	1.25	0.67	40.91705
## 29	5.0	14.0	12	190	25	3	1.33	0.67	41.01549
## 30	0.0	13.0	12	25	25	2	1.00	0.75	28.02576
## 31	0.0	11.0	15	40	25	1	1.00	0.88	35.25244
## 32	0.0	15.0	9	45	25	2	1.00	0.75	23.80404
## 33	3.0	15.0	5	85	25	3	1.00	0.88	52.07690
## 34	3.0	17.0	3	90	25	3	1.00	0.25	53.37101
## 35	3.0	13.0	4	100	25	3	1.00	0.33	45.81172
## 36	1.0	12.0	11	45	25	2	1.00	1.00	21.87129
## 37	1.5	11.5	10	90	25	1	1.00	0.75	31.07222
## 38	0.0	14.0	11	35	25	1	1.00	1.33	28.74241
## 39	1.0	17.0	6	60	100	3	1.00	1.00	36.52368
## 40	2.0	20.0	9	95	100	3	1.30	0.75	36.47151
## 41	0.0	21.0	3	40	25	2	1.00	1.50	39.24111
## 42	2.0	12.0	6	95	25	2	1.00	0.67	45.32807
## 43	0.0	12.0	12	55	25	2	1.00	1.00	26.73451
## 44	0.0	16.0	3	95	25	2	1.00	1.00	54.85092
## 45	3.0	16.0	11	170	25	3	1.00	1.00	37.13686
## 46	3.0	16.0	11	170	25	3	1.00	1.00	34.13976
## 47	3.0	17.0	13	160	25	3	1.50	0.67	30.31335
## 48	2.0	15.0	6	90	25	1	1.00	1.00	40.10596
## 49	0.0	15.0	9	40	25	2	1.00	0.67	29.92429
## 50	3.0	21.0	7	130	25	3	1.33	0.67	40.69232
## 51	3.0	18.0	2	90	25	3	1.00	1.00	59.64284
## 52	1.5	13.5	10	120	25	3	1.25	0.50	30.45084
## 53	6.0	11.0	14	260	25	3	1.33	0.67	37.84059
## 54	1.0	20.0	3	45	100	3	1.00	1.00	41.50354
## 55	0.0	13.0	0	15	0	3	0.50	1.00	60.75611
## 56	1.0	10.0	0	50	0	3	0.50	1.00	63.00565
## 57	2.0	14.0	6	110	25	3	1.00	0.50	49.51187
## 58	2.7	NA	NA	110	0	1	1.00	0.67	50.82839
## 59	5.0	14.0	12	240	25	2	1.33	0.75	39.25920
## 60	2.5	10.5	8	140	25	3	1.00	0.50	39.70340
## 61	2.0	15.0	6	110	25	3	1.00	0.50	55.33314
## 62	0.0	23.0	2	30	25	1	1.00	1.13	41.99893
## 63	0.0	22.0	3	35	25	1	1.00	1.00	40.56016
## 64	3.0	16.0	0	95	0	1	0.83	1.00	68.23588
## 65	4.0	19.0	0	140	0	1	1.00	0.67	74.47295

```
## 66 3.0 20.0 0 120 0 1 1.00 0.67 72.80179
## 67 1.0 9.0 15 40 25 2 1.00 0.75 31.23005
## 68 1.0 16.0 3 55 25 1 1.00 1.00 53.13132
## 69 3.0 15.0 5 90 25 2 1.00 1.00 59.36399
## 70 0.0 21.0 3 35 100 3 1.00 1.00 38.83975
## 71 4.0 15.0 14 230 100 3 1.50 1.00 28.59278
## 72 3.0 16.0 3 110 100 3 1.00 1.00 46.65884
## 73 0.0 21.0 3 60 25 3 1.00 0.75 39.10617
## 74 0.0 13.0 12 25 25 2 1.00 1.00 27.75330
## 75 3.0 17.0 3 115 25 1 1.00 0.67 49.78744
## 76 3.0 17.0 3 110 25 1 1.00 1.00 51.59219
## 77 1.0 16.0 8 60 25 1 1.00 0.75 36.18756
```

```
str(Cereals)
```

```
## 'data.frame': 77 obs. of 16 variables:
## $ name : chr "100%_Bran" "100%_Natural_Bran" "All-Bran" "All-Bran_with_Extra_Fiber" ...
## $ mfr : chr "N" "Q" "K" "K" ...
## $ type : chr "C" "C" "C" "C" ...
## $ calories: int 70 120 70 50 110 110 110 130 90 90 ...
## $ protein : int 4 3 4 4 2 2 2 3 2 3 ...
## $ fat : int 1 5 1 0 2 2 0 2 1 0 ...
## $ sodium : int 130 15 260 140 200 180 125 210 200 210 ...
## $ fiber : num 10 2 9 14 1 1.5 1 2 4 5 ...
## $ carbo : num 5 8 7 8 14 10.5 11 18 15 13 ...
## $ sugars : int 6 8 5 0 8 10 14 8 6 5 ...
## $ potass : int 280 135 320 330 NA 70 30 100 125 190 ...
## $ vitamins: int 25 0 25 25 25 25 25 25 25 ...
## $ shelf : int 3 3 3 3 3 1 2 3 1 3 ...
## $ weight : num 1 1 1 1 1 1 1 1.33 1 1 ...
## $ cups : num 0.33 1 0.33 0.5 0.75 0.75 1 0.75 0.67 0.67 ...
## $ rating : num 68.4 34 59.4 93.7 34.4 ...
```

```
head(Cereals)
```

```
##           name mfr type calories protein fat sodium fiber carbo
## 1      100%_Bran  N   C        70         4  1   130  10.0   5.0
## 2  100%_Natural_Bran  Q   C       120         3  5    15   2.0   8.0
## 3        All-Bran   K   C        70         4  1   260   9.0   7.0
## 4 All-Bran_with_Extra_Fiber  K   C        50         4  0   140  14.0   8.0
## 5      Almond_Delight  R   C       110         2  2   200   1.0  14.0
## 6  Apple_Cinnamon_Cheerios  G   C       110         2  2   180   1.5  10.5
##  sugars potass vitamins shelf weight cups  rating
## 1      6      280        25     3      1 0.33 68.40297
## 2      8      135         0     3      1 1.00 33.98368
## 3      5      320        25     3      1 0.33 59.42551
## 4      0      330        25     3      1 0.50 93.70491
## 5      8       NA        25     3      1 0.75 34.38484
## 6     10       70        25     1      1 0.75 29.50954
```

```
Cereals = Cereals[-which(is.na(Cereals$carbo)),]
Cereals = Cereals[-which(is.na(Cereals$potass)),]
Cereals
```

##		name	mfr	type	calories	protein	fat	sodium
## 1		100%_Bran	N	C	70	4	1	130
## 2		100%_Natural_Bran	Q	C	120	3	5	15
## 3		All-Bran	K	C	70	4	1	260
## 4		All-Bran_with_Extra_Fiber	K	C	50	4	0	140
## 6		Apple_Cinnamon_Cheerios	G	C	110	2	2	180
## 7		Apple_Jacks	K	C	110	2	0	125
## 8		Basic_4	G	C	130	3	2	210
## 9		Bran_Chex	R	C	90	2	1	200
## 10		Bran_Flakes	P	C	90	3	0	210
## 11		Cap'n'Crunch	Q	C	120	1	2	220
## 12		Cheerios	G	C	110	6	2	290
## 13		Cinnamon_Toast_Crunch	G	C	120	1	3	210
## 14		Clusters	G	C	110	3	2	140
## 15		Cocoa_Puffs	G	C	110	1	1	180
## 16		Corn_Chex	R	C	110	2	0	280
## 17		Corn_Flakes	K	C	100	2	0	290
## 18		Corn_Pops	K	C	110	1	0	90
## 19		Count_Chocula	G	C	110	1	1	180
## 20		Cracklin'_Oat_Bran	K	C	110	3	3	140
## 22		Crispix	K	C	110	2	0	220
## 23		Crispy_Wheat_&_Raisins	G	C	100	2	1	140
## 24		Double_Chex	R	C	100	2	0	190
## 25		Froot_Loops	K	C	110	2	1	125
## 26		Frosted_Flakes	K	C	110	1	0	200
## 27		Frosted_Mini-Wheats	K	C	100	3	0	0
## 28		Fruit_&_Fibre_Dates,_Walnuts,_and_Oats	P	C	120	3	2	160
## 29		Fruitful_Bran	K	C	120	3	0	240
## 30		Fruity_Pebbles	P	C	110	1	1	135
## 31		Golden_Crisp	P	C	100	2	0	45
## 32		Golden_Grahams	G	C	110	1	1	280
## 33		Grape_Nuts_Flakes	P	C	100	3	1	140
## 34		Grape-Nuts	P	C	110	3	0	170
## 35		Great_Grains_Pecan	P	C	120	3	3	75
## 36		Honey_Graham_Ohs	Q	C	120	1	2	220
## 37		Honey_Nut_Cheerios	G	C	110	3	1	250
## 38		Honey-comb	P	C	110	1	0	180
## 39		Just_Right_Crunchy__Nuggets	K	C	110	2	1	170
## 40		Just_Right_Fruit_&_Nut	K	C	140	3	1	170
## 41		Kix	G	C	110	2	1	260
## 42		Life	Q	C	100	4	2	150
## 43		Lucky_Charms	G	C	110	2	1	180
## 44		Maypo	A	H	100	4	1	0
## 45		Muesli_Raisins,_Dates,_&_Almonds	R	C	150	4	3	95
## 46		Muesli_Raisins,_Peaches,_&_Pecans	R	C	150	4	3	150
## 47		Mueslix_Crispy_Blend	K	C	160	3	2	150
## 48		Multi-Grain_Cheerios	G	C	100	2	1	220
## 49		Nut&Honey_Crunch	K	C	120	2	1	190
## 50		Nutri-Grain_Almond-Raisin	K	C	140	3	2	220
## 51		Nutri-grain_Wheat	K	C	90	3	0	170
## 52		Oatmeal_Raisin_Crisp	G	C	130	3	2	170
## 53		Post_Nat._Raisin_Bran	P	C	120	3	1	200
## 54		Product_19	K	C	100	3	0	320
## 55		Puffed_Rice	Q	C	50	1	0	0

## 56	Puffed_Wheat	Q	C	50	2	0	0
## 57	Quaker_Oat_Squares	Q	C	100	4	1	135
## 59	Raisin_Bran	K	C	120	3	1	210
## 60	Raisin_Nut_Bran	G	C	100	3	2	140
## 61	Raisin_Squares	K	C	90	2	0	0
## 62	Rice_Chex	R	C	110	1	0	240
## 63	Rice_Krispies	K	C	110	2	0	290
## 64	Shredded_Wheat	N	C	80	2	0	0
## 65	Shredded_Wheat_'n'Bran	N	C	90	3	0	0
## 66	Shredded_Wheat_spoon_size	N	C	90	3	0	0
## 67	Smacks	K	C	110	2	1	70
## 68	Special_K	K	C	110	6	0	230
## 69	Strawberry_Fruit_Wheats	N	C	90	2	0	15
## 70	Total_Corn_Flakes	G	C	110	2	1	200
## 71	Total_Raisin_Bran	G	C	140	3	1	190
## 72	Total_Whole_Grain	G	C	100	3	1	200
## 73	Triples	G	C	110	2	1	250
## 74	Trix	G	C	110	1	1	140
## 75	Wheat_Chex	R	C	100	3	1	230
## 76	Wheaties	G	C	100	3	1	200
## 77	Wheaties_Honey_Gold	G	C	110	2	1	200
##	fiber	carbo	sugars	potass	vitamins	shelf	weight cups rating
## 1	10.0	5.0	6	280	25	3	1.00 0.33 68.40297
## 2	2.0	8.0	8	135	0	3	1.00 1.00 33.98368
## 3	9.0	7.0	5	320	25	3	1.00 0.33 59.42551
## 4	14.0	8.0	0	330	25	3	1.00 0.50 93.70491
## 6	1.5	10.5	10	70	25	1	1.00 0.75 29.50954
## 7	1.0	11.0	14	30	25	2	1.00 1.00 33.17409
## 8	2.0	18.0	8	100	25	3	1.33 0.75 37.03856
## 9	4.0	15.0	6	125	25	1	1.00 0.67 49.12025
## 10	5.0	13.0	5	190	25	3	1.00 0.67 53.31381
## 11	0.0	12.0	12	35	25	2	1.00 0.75 18.04285
## 12	2.0	17.0	1	105	25	1	1.00 1.25 50.76500
## 13	0.0	13.0	9	45	25	2	1.00 0.75 19.82357
## 14	2.0	13.0	7	105	25	3	1.00 0.50 40.40021
## 15	0.0	12.0	13	55	25	2	1.00 1.00 22.73645
## 16	0.0	22.0	3	25	25	1	1.00 1.00 41.44502
## 17	1.0	21.0	2	35	25	1	1.00 1.00 45.86332
## 18	1.0	13.0	12	20	25	2	1.00 1.00 35.78279
## 19	0.0	12.0	13	65	25	2	1.00 1.00 22.39651
## 20	4.0	10.0	7	160	25	3	1.00 0.50 40.44877
## 22	1.0	21.0	3	30	25	3	1.00 1.00 46.89564
## 23	2.0	11.0	10	120	25	3	1.00 0.75 36.17620
## 24	1.0	18.0	5	80	25	3	1.00 0.75 44.33086
## 25	1.0	11.0	13	30	25	2	1.00 1.00 32.20758
## 26	1.0	14.0	11	25	25	1	1.00 0.75 31.43597
## 27	3.0	14.0	7	100	25	2	1.00 0.80 58.34514
## 28	5.0	12.0	10	200	25	3	1.25 0.67 40.91705
## 29	5.0	14.0	12	190	25	3	1.33 0.67 41.01549
## 30	0.0	13.0	12	25	25	2	1.00 0.75 28.02576
## 31	0.0	11.0	15	40	25	1	1.00 0.88 35.25244
## 32	0.0	15.0	9	45	25	2	1.00 0.75 23.80404
## 33	3.0	15.0	5	85	25	3	1.00 0.88 52.07690
## 34	3.0	17.0	3	90	25	3	1.00 0.25 53.37101

```
## 35  3.0 13.0    4  100    25  3  1.00 0.33 45.81172
## 36  1.0 12.0   11   45    25  2  1.00 1.00 21.87129
## 37  1.5 11.5   10   90    25  1  1.00 0.75 31.07222
## 38  0.0 14.0   11   35    25  1  1.00 1.33 28.74241
## 39  1.0 17.0    6   60   100  3  1.00 1.00 36.52368
## 40  2.0 20.0    9   95   100  3  1.30 0.75 36.47151
## 41  0.0 21.0    3   40    25  2  1.00 1.50 39.24111
## 42  2.0 12.0    6   95    25  2  1.00 0.67 45.32807
## 43  0.0 12.0   12   55    25  2  1.00 1.00 26.73451
## 44  0.0 16.0    3   95    25  2  1.00 1.00 54.85092
## 45  3.0 16.0   11  170    25  3  1.00 1.00 37.13686
## 46  3.0 16.0   11  170    25  3  1.00 1.00 34.13976
## 47  3.0 17.0   13  160    25  3  1.50 0.67 30.31335
## 48  2.0 15.0    6   90    25  1  1.00 1.00 40.10596
## 49  0.0 15.0    9   40    25  2  1.00 0.67 29.92429
## 50  3.0 21.0    7  130    25  3  1.33 0.67 40.69232
## 51  3.0 18.0    2   90    25  3  1.00 1.00 59.64284
## 52  1.5 13.5   10  120    25  3  1.25 0.50 30.45084
## 53  6.0 11.0   14  260    25  3  1.33 0.67 37.84059
## 54  1.0 20.0    3   45   100  3  1.00 1.00 41.50354
## 55  0.0 13.0    0   15     0  3  0.50 1.00 60.75611
## 56  1.0 10.0    0   50     0  3  0.50 1.00 63.00565
## 57  2.0 14.0    6  110    25  3  1.00 0.50 49.51187
## 59  5.0 14.0   12  240    25  2  1.33 0.75 39.25920
## 60  2.5 10.5    8  140    25  3  1.00 0.50 39.70340
## 61  2.0 15.0    6  110    25  3  1.00 0.50 55.33314
## 62  0.0 23.0    2   30    25  1  1.00 1.13 41.99893
## 63  0.0 22.0    3   35    25  1  1.00 1.00 40.56016
## 64  3.0 16.0    0   95     0  1  0.83 1.00 68.23588
## 65  4.0 19.0    0  140     0  1  1.00 0.67 74.47295
## 66  3.0 20.0    0  120     0  1  1.00 0.67 72.80179
## 67  1.0   9.0   15   40    25  2  1.00 0.75 31.23005
## 68  1.0 16.0    3   55    25  1  1.00 1.00 53.13132
## 69  3.0 15.0    5   90    25  2  1.00 1.00 59.36399
## 70  0.0 21.0    3   35   100  3  1.00 1.00 38.83975
## 71  4.0 15.0   14  230   100  3  1.50 1.00 28.59278
## 72  3.0 16.0    3  110   100  3  1.00 1.00 46.65884
## 73  0.0 21.0    3   60    25  3  1.00 0.75 39.10617
## 74  0.0 13.0   12   25    25  2  1.00 1.00 27.75330
## 75  3.0 17.0    3  115    25  1  1.00 0.67 49.78744
## 76  3.0 17.0    3  110    25  1  1.00 1.00 51.59219
## 77  1.0 16.0    8   60    25  1  1.00 0.75 36.18756
```

```
# Make row names the names of the utilities, remove numerical labeling of rows
row.names(Cereals) <- Cereals[,1]
```

```
Cereals <- Cereals[,-1]
Cereals
```

```
##                                mfr type calories protein fat sodium
## 100%_Bran                      N    C      70        4   1   130
## 100%_Natural_Bran              Q    C     120        3   5    15
## All-Bran                      K    C      70        4   1   260
## All-Bran_with_Extra_Fiber      K    C      50        4   0   140
```

## Apple_Cinnamon_Cheerios	G	C	110	2	2	180
## Apple_Jacks	K	C	110	2	0	125
## Basic_4	G	C	130	3	2	210
## Bran_Chex	R	C	90	2	1	200
## Bran_Flakes	P	C	90	3	0	210
## Cap'n'Crunch	Q	C	120	1	2	220
## Cheerios	G	C	110	6	2	290
## Cinnamon_Toast_Crunch	G	C	120	1	3	210
## Clusters	G	C	110	3	2	140
## Cocoa_Puffs	G	C	110	1	1	180
## Corn_Chex	R	C	110	2	0	280
## Corn_Flakes	K	C	100	2	0	290
## Corn_Pops	K	C	110	1	0	90
## Count_Chocula	G	C	110	1	1	180
## Cracklin'_Oat_Bran	K	C	110	3	3	140
## Crispix	K	C	110	2	0	220
## Crispy_Wheat_&_Raisins	G	C	100	2	1	140
## Double_Chex	R	C	100	2	0	190
## Froot_Loops	K	C	110	2	1	125
## Frosted_Flakes	K	C	110	1	0	200
## Frosted_Mini-Wheats	K	C	100	3	0	0
## Fruit_&_Fibre_Dates,_Walnuts,_and_Oats	P	C	120	3	2	160
## Fruitful_Bran	K	C	120	3	0	240
## Fruity_Pebbles	P	C	110	1	1	135
## Golden_Crisp	P	C	100	2	0	45
## Golden_Grahams	G	C	110	1	1	280
## Grape_Nuts_Flakes	P	C	100	3	1	140
## Grape-Nuts	P	C	110	3	0	170
## Great_Grains_Pecan	P	C	120	3	3	75
## Honey_Graham_Ohs	Q	C	120	1	2	220
## Honey_Nut_Cheerios	G	C	110	3	1	250
## Honey-comb	P	C	110	1	0	180
## Just_Right_Crunchy__Nuggets	K	C	110	2	1	170
## Just_Right_Fruit_&_Nut	K	C	140	3	1	170
## Kix	G	C	110	2	1	260
## Life	Q	C	100	4	2	150
## Lucky_Charms	G	C	110	2	1	180
## Maypo	A	H	100	4	1	0
## Muesli_Raisins,_Dates,_&_Almonds	R	C	150	4	3	95
## Muesli_Raisins,_Peaches,_&_Pecans	R	C	150	4	3	150
## Mueslix_Crispy_Blend	K	C	160	3	2	150
## Multi-Grain_Cheerios	G	C	100	2	1	220
## Nut&Honey_Crunch	K	C	120	2	1	190
## Nutri-Grain_Almond-Raisin	K	C	140	3	2	220
## Nutri-grain_Wheat	K	C	90	3	0	170
## Oatmeal_Raisin_Crisp	G	C	130	3	2	170
## Post_Nat._Raisin_Bran	P	C	120	3	1	200
## Product_19	K	C	100	3	0	320
## Puffed_Rice	Q	C	50	1	0	0
## Puffed_Wheat	Q	C	50	2	0	0
## Quaker_Oat_Squares	Q	C	100	4	1	135
## Raisin_Bran	K	C	120	3	1	210
## Raisin_Nut_Bran	G	C	100	3	2	140
## Raisin_Squares	K	C	90	2	0	0



## Rice_Chex	R	C	110	1	0	240
## Rice_Krispies	K	C	110	2	0	290
## Shredded_Wheat	N	C	80	2	0	0
## Shredded_Wheat_'n'Bran	N	C	90	3	0	0
## Shredded_Wheat_spoon_size	N	C	90	3	0	0
## Smacks	K	C	110	2	1	70
## Special_K	K	C	110	6	0	230
## Strawberry_Fruit_Wheats	N	C	90	2	0	15
## Total_Corn_Flakes	G	C	110	2	1	200
## Total_Raisin_Bran	G	C	140	3	1	190
## Total_Whole_Grain	G	C	100	3	1	200
## Triples	G	C	110	2	1	250
## Trix	G	C	110	1	1	140
## Wheat_Chex	R	C	100	3	1	230
## Wheaties	G	C	100	3	1	200
## Wheaties_Honey_Gold	G	C	110	2	1	200
##						
	fiber	carbo	sugars	potass	vitamins	shelf
## 100%_Bran	10.0	5.0	6	280	25	3
## 100%_Natural_Bran	2.0	8.0	8	135	0	3
## All-Bran	9.0	7.0	5	320	25	3
## All-Bran_with_Extra_Fiber	14.0	8.0	0	330	25	3
## Apple_Cinnamon_Cheerios	1.5	10.5	10	70	25	1
## Apple_Jacks	1.0	11.0	14	30	25	2
## Basic_4	2.0	18.0	8	100	25	3
## Bran_Chex	4.0	15.0	6	125	25	1
## Bran_Flakes	5.0	13.0	5	190	25	3
## Cap'n'Crunch	0.0	12.0	12	35	25	2
## Cheerios	2.0	17.0	1	105	25	1
## Cinnamon_Toast_Crunch	0.0	13.0	9	45	25	2
## Clusters	2.0	13.0	7	105	25	3
## Cocoa_Puffs	0.0	12.0	13	55	25	2
## Corn_Chex	0.0	22.0	3	25	25	1
## Corn_Flakes	1.0	21.0	2	35	25	1
## Corn_Pops	1.0	13.0	12	20	25	2
## Count_Chocula	0.0	12.0	13	65	25	2
## Cracklin'_Oat_Bran	4.0	10.0	7	160	25	3
## Crispix	1.0	21.0	3	30	25	3
## Crispy_Wheat_&_Raisins	2.0	11.0	10	120	25	3
## Double_Chex	1.0	18.0	5	80	25	3
## Froot_Loops	1.0	11.0	13	30	25	2
## Frosted_Flakes	1.0	14.0	11	25	25	1
## Frosted_Mini-Wheats	3.0	14.0	7	100	25	2
## Fruit_&_Fibre_Dates,_Walnuts,_and_Oats	5.0	12.0	10	200	25	3
## Fruitful_Bran	5.0	14.0	12	190	25	3
## Fruity_Pebbles	0.0	13.0	12	25	25	2
## Golden_Crisp	0.0	11.0	15	40	25	1
## Golden_Grahams	0.0	15.0	9	45	25	2
## Grape_Nuts_Flakes	3.0	15.0	5	85	25	3
## Grape-Nuts	3.0	17.0	3	90	25	3
## Great_Grains_Pecan	3.0	13.0	4	100	25	3
## Honey_Graham_Ohs	1.0	12.0	11	45	25	2
## Honey_Nut_Cheerios	1.5	11.5	10	90	25	1
## Honey-comb	0.0	14.0	11	35	25	1
## Just_Right_Crunchy__Nuggets	1.0	17.0	6	60	100	3

## Just_Right_Fruit_&_Nut	2.0	20.0	9	95	100	3
## Kix	0.0	21.0	3	40	25	2
## Life	2.0	12.0	6	95	25	2
## Lucky_Charms	0.0	12.0	12	55	25	2
## Maypo	0.0	16.0	3	95	25	2
## Muesli_Raisins,_Dates,_&_Almonds	3.0	16.0	11	170	25	3
## Muesli_Raisins,_Peaches,_&_Pecans	3.0	16.0	11	170	25	3
## Mueslix_Crispy_Blend	3.0	17.0	13	160	25	3
## Multi-Grain_Cheerios	2.0	15.0	6	90	25	1
## Nut&Honey_Crunch	0.0	15.0	9	40	25	2
## Nutri-Grain_Almond-Raisin	3.0	21.0	7	130	25	3
## Nutri-grain_Wheat	3.0	18.0	2	90	25	3
## Oatmeal_Raisin_Crisp	1.5	13.5	10	120	25	3
## Post_Nat._Raisin_Bran	6.0	11.0	14	260	25	3
## Product_19	1.0	20.0	3	45	100	3
## Puffed_Rice	0.0	13.0	0	15	0	3
## Puffed_Wheat	1.0	10.0	0	50	0	3
## Quaker_Oat_Squares	2.0	14.0	6	110	25	3
## Raisin_Bran	5.0	14.0	12	240	25	2
## Raisin_Nut_Bran	2.5	10.5	8	140	25	3
## Raisin_Squares	2.0	15.0	6	110	25	3
## Rice_Chex	0.0	23.0	2	30	25	1
## Rice_Krispies	0.0	22.0	3	35	25	1
## Shredded_Wheat	3.0	16.0	0	95	0	1
## Shredded_Wheat_ 'n' Bran	4.0	19.0	0	140	0	1
## Shredded_Wheat_spoon_size	3.0	20.0	0	120	0	1
## Smacks	1.0	9.0	15	40	25	2
## Special_K	1.0	16.0	3	55	25	1
## Strawberry_Fruit_Wheats	3.0	15.0	5	90	25	2
## Total_Corn_Flakes	0.0	21.0	3	35	100	3
## Total_Raisin_Bran	4.0	15.0	14	230	100	3
## Total_Whole_Grain	3.0	16.0	3	110	100	3
## Triples	0.0	21.0	3	60	25	3
## Trix	0.0	13.0	12	25	25	2
## Wheat_Chex	3.0	17.0	3	115	25	1
## Wheaties	3.0	17.0	3	110	25	1
## Wheaties_Honey_Gold	1.0	16.0	8	60	25	1
##						
	weight	cups	rating			
## 100%_Bran	1.00	0.33	68.40297			
## 100%_Natural_Bran	1.00	1.00	33.98368			
## All-Bran	1.00	0.33	59.42551			
## All-Bran_with_Extra_Fiber	1.00	0.50	93.70491			
## Apple_Cinnamon_Cheerios	1.00	0.75	29.50954			
## Apple_Jacks	1.00	1.00	33.17409			
## Basic_4	1.33	0.75	37.03856			
## Bran_Chex	1.00	0.67	49.12025			
## Bran_Flakes	1.00	0.67	53.31381			
## Cap'n'Crunch	1.00	0.75	18.04285			
## Cheerios	1.00	1.25	50.76500			
## Cinnamon_Toast_Crunch	1.00	0.75	19.82357			
## Clusters	1.00	0.50	40.40021			
## Cocoa_Puffs	1.00	1.00	22.73645			
## Corn_Chex	1.00	1.00	41.44502			
## Corn_Flakes	1.00	1.00	45.86332			

## Corn_Pops	1.00	1.00	35.78279
## Count_Chocula	1.00	1.00	22.39651
## Cracklin'_Oat_Bran	1.00	0.50	40.44877
## Crispix	1.00	1.00	46.89564
## Crispy_Wheat_&_Raisins	1.00	0.75	36.17620
## Double_Chex	1.00	0.75	44.33086
## Froot_Loops	1.00	1.00	32.20758
## Frosted_Flakes	1.00	0.75	31.43597
## Frosted_Mini-Wheats	1.00	0.80	58.34514
## Fruit_&_Fibre_Dates,_Walnuts,_and_Oats	1.25	0.67	40.91705
## Fruitful_Bran	1.33	0.67	41.01549
## Fruity_Pebbles	1.00	0.75	28.02576
## Golden_Crisp	1.00	0.88	35.25244
## Golden_Grahams	1.00	0.75	23.80404
## Grape_Nuts_Flakes	1.00	0.88	52.07690
## Grape-Nuts	1.00	0.25	53.37101
## Great_Grains_Pecan	1.00	0.33	45.81172
## Honey_Graham_Ohs	1.00	1.00	21.87129
## Honey_Nut_Cheerios	1.00	0.75	31.07222
## Honey-comb	1.00	1.33	28.74241
## Just_Right_Crunchy__Nuggets	1.00	1.00	36.52368
## Just_Right_Fruit_&_Nut	1.30	0.75	36.47151
## Kix	1.00	1.50	39.24111
## Life	1.00	0.67	45.32807
## Lucky_Charms	1.00	1.00	26.73451
## Maypo	1.00	1.00	54.85092
## Muesli_Raisins,_Dates,_&_Almonds	1.00	1.00	37.13686
## Muesli_Raisins,_Peaches,_&_Pecans	1.00	1.00	34.13976
## Mueslix_Crispy_Blend	1.50	0.67	30.31335
## Multi-Grain_Cheerios	1.00	1.00	40.10596
## Nut&Honey_Crunch	1.00	0.67	29.92429
## Nutri-Grain_Almond-Raisin	1.33	0.67	40.69232
## Nutri-grain_Wheat	1.00	1.00	59.64284
## Oatmeal_Raisin_Crisp	1.25	0.50	30.45084
## Post_Nat._Raisin_Bran	1.33	0.67	37.84059
## Product_19	1.00	1.00	41.50354
## Puffed_Rice	0.50	1.00	60.75611
## Puffed_Wheat	0.50	1.00	63.00565
## Quaker_Oat_Squares	1.00	0.50	49.51187
## Raisin_Bran	1.33	0.75	39.25920
## Raisin_Nut_Bran	1.00	0.50	39.70340
## Raisin_Squares	1.00	0.50	55.33314
## Rice_Chex	1.00	1.13	41.99893
## Rice_Krispies	1.00	1.00	40.56016
## Shredded_Wheat	0.83	1.00	68.23588
## Shredded_Wheat_'n'Bran	1.00	0.67	74.47295
## Shredded_Wheat_spoon_size	1.00	0.67	72.80179
## Smacks	1.00	0.75	31.23005
## Special_K	1.00	1.00	53.13132
## Strawberry_Fruit_Wheats	1.00	1.00	59.36399
## Total_Corn_Flakes	1.00	1.00	38.83975
## Total_Raisin_Bran	1.50	1.00	28.59278
## Total_Whole_Grain	1.00	1.00	46.65884
## Triples	1.00	0.75	39.10617

```
## Trix 1.00 1.00 27.75330
## Wheat_Chex 1.00 0.67 49.78744
## Wheaties 1.00 1.00 51.59219
## Wheaties_Honey_Gold 1.00 0.75 36.18756
```

```
#Removing the mfr column
```

```
Cereals <- Cereals[,-1]
```

```
Cereals
```

```
## type calories protein fat sodium fiber
## 100%_Bran C 70 4 1 130 10.0
## 100%_Natural_Bran C 120 3 5 15 2.0
## All-Bran C 70 4 1 260 9.0
## All-Bran_with_Extra_Fiber C 50 4 0 140 14.0
## Apple_Cinnamon_Cheerios C 110 2 2 180 1.5
## Apple_Jacks C 110 2 0 125 1.0
## Basic_4 C 130 3 2 210 2.0
## Bran_Chex C 90 2 1 200 4.0
## Bran_Flakes C 90 3 0 210 5.0
## Cap'n'Crunch C 120 1 2 220 0.0
## Cheerios C 110 6 2 290 2.0
## Cinnamon_Toast_Crunch C 120 1 3 210 0.0
## Clusters C 110 3 2 140 2.0
## Cocoa_Puffs C 110 1 1 180 0.0
## Corn_Chex C 110 2 0 280 0.0
## Corn_Flakes C 100 2 0 290 1.0
## Corn_Pops C 110 1 0 90 1.0
## Count_Chocula C 110 1 1 180 0.0
## Cracklin'_Oat_Bran C 110 3 3 140 4.0
## Crispix C 110 2 0 220 1.0
## Crispy_Wheat_&_Raisins C 100 2 1 140 2.0
## Double_Chex C 100 2 0 190 1.0
## Froot_Loops C 110 2 1 125 1.0
## Frosted_Flakes C 110 1 0 200 1.0
## Frosted_Mini-Wheats C 100 3 0 0 3.0
## Fruit_&_Fibre_Dates,_Walnuts,_and_Oats C 120 3 2 160 5.0
## Fruitful_Bran C 120 3 0 240 5.0
## Fruity_Pebbles C 110 1 1 135 0.0
## Golden_Crisp C 100 2 0 45 0.0
## Golden_Grahams C 110 1 1 280 0.0
## Grape_Nuts_Flakes C 100 3 1 140 3.0
## Grape-Nuts C 110 3 0 170 3.0
## Great_Grains_Pecan C 120 3 3 75 3.0
## Honey_Graham_Ohs C 120 1 2 220 1.0
## Honey_Nut_Cheerios C 110 3 1 250 1.5
## Honey-comb C 110 1 0 180 0.0
## Just_Right_Crunchy__Nuggets C 110 2 1 170 1.0
## Just_Right_Fruit_&_Nut C 140 3 1 170 2.0
## Kix C 110 2 1 260 0.0
## Life C 100 4 2 150 2.0
## Lucky_Charms C 110 2 1 180 0.0
## Maypo H 100 4 1 0 0.0
## Muesli_Raisins,_Dates,_&_Almonds C 150 4 3 95 3.0
## Muesli_Raisins,_Peaches,_&_Pecans C 150 4 3 150 3.0
```

## Mueslix_Crispy_Blend	C	160	3	2	150	3.0
## Multi-Grain_Cheerios	C	100	2	1	220	2.0
## Nut&Honey_Crunch	C	120	2	1	190	0.0
## Nutri-Grain_Almond-Raisin	C	140	3	2	220	3.0
## Nutri-grain_Wheat	C	90	3	0	170	3.0
## Oatmeal_Raisin_Crisp	C	130	3	2	170	1.5
## Post_Nat._Raisin_Bran	C	120	3	1	200	6.0
## Product_19	C	100	3	0	320	1.0
## Puffed_Rice	C	50	1	0	0	0.0
## Puffed_Wheat	C	50	2	0	0	1.0
## Quaker_Oat_Squares	C	100	4	1	135	2.0
## Raisin_Bran	C	120	3	1	210	5.0
## Raisin_Nut_Bran	C	100	3	2	140	2.5
## Raisin_Squares	C	90	2	0	0	2.0
## Rice_Chex	C	110	1	0	240	0.0
## Rice_Krispies	C	110	2	0	290	0.0
## Shredded_Wheat	C	80	2	0	0	3.0
## Shredded_Wheat_'n'Bran	C	90	3	0	0	4.0
## Shredded_Wheat_spoon_size	C	90	3	0	0	3.0
## Smacks	C	110	2	1	70	1.0
## Special_K	C	110	6	0	230	1.0
## Strawberry_Fruit_Wheats	C	90	2	0	15	3.0
## Total_Corn_Flakes	C	110	2	1	200	0.0
## Total_Raisin_Bran	C	140	3	1	190	4.0
## Total_Whole_Grain	C	100	3	1	200	3.0
## Triples	C	110	2	1	250	0.0
## Trix	C	110	1	1	140	0.0
## Wheat_Chex	C	100	3	1	230	3.0
## Wheaties	C	100	3	1	200	3.0
## Wheaties_Honey_Gold	C	110	2	1	200	1.0
##						
	carbo	sugars	potass	vitamins	shelf	
## 100%_Bran	5.0	6	280	25	3	
## 100%_Natural_Bran	8.0	8	135	0	3	
## All-Bran	7.0	5	320	25	3	
## All-Bran_with_Extra_Fiber	8.0	0	330	25	3	
## Apple_Cinnamon_Cheerios	10.5	10	70	25	1	
## Apple_Jacks	11.0	14	30	25	2	
## Basic_4	18.0	8	100	25	3	
## Bran_Chex	15.0	6	125	25	1	
## Bran_Flakes	13.0	5	190	25	3	
## Cap'n'Crunch	12.0	12	35	25	2	
## Cheerios	17.0	1	105	25	1	
## Cinnamon_Toast_Crunch	13.0	9	45	25	2	
## Clusters	13.0	7	105	25	3	
## Cocoa_Puffs	12.0	13	55	25	2	
## Corn_Chex	22.0	3	25	25	1	
## Corn_Flakes	21.0	2	35	25	1	
## Corn_Pops	13.0	12	20	25	2	
## Count_Chocula	12.0	13	65	25	2	
## Cracklin'_Oat_Bran	10.0	7	160	25	3	
## Crispix	21.0	3	30	25	3	
## Crispy_Wheat_&_Raisins	11.0	10	120	25	3	
## Double_Chex	18.0	5	80	25	3	
## Froot_Loops	11.0	13	30	25	2	

## Frosted_Flakes	14.0	11	25	25	1
## Frosted_Mini-Wheats	14.0	7	100	25	2
## Fruit_&_Fibre_Dates,_Walnuts,_and_Oats	12.0	10	200	25	3
## Fruitful_Bran	14.0	12	190	25	3
## Fruity_Pebbles	13.0	12	25	25	2
## Golden_Crisp	11.0	15	40	25	1
## Golden_Grahams	15.0	9	45	25	2
## Grape_Nuts_Flakes	15.0	5	85	25	3
## Grape-Nuts	17.0	3	90	25	3
## Great_Grains_Pecan	13.0	4	100	25	3
## Honey_Graham_Ohs	12.0	11	45	25	2
## Honey_Nut_Cheerios	11.5	10	90	25	1
## Honey-comb	14.0	11	35	25	1
## Just_Right_Crunchy__Nuggets	17.0	6	60	100	3
## Just_Right_Fruit_&_Nut	20.0	9	95	100	3
## Kix	21.0	3	40	25	2
## Life	12.0	6	95	25	2
## Lucky_Charms	12.0	12	55	25	2
## Maypo	16.0	3	95	25	2
## Muesli_Raisins,_Dates,_&_Almonds	16.0	11	170	25	3
## Muesli_Raisins,_Peaches,_&_Pecans	16.0	11	170	25	3
## Mueslix_Crispy_Blend	17.0	13	160	25	3
## Multi-Grain_Cheerios	15.0	6	90	25	1
## Nut&Honey_Crunch	15.0	9	40	25	2
## Nutri-Grain_Almond-Raisin	21.0	7	130	25	3
## Nutri-grain_Wheat	18.0	2	90	25	3
## Oatmeal_Raisin_Crisp	13.5	10	120	25	3
## Post_Nat._Raisin_Bran	11.0	14	260	25	3
## Product_19	20.0	3	45	100	3
## Puffed_Rice	13.0	0	15	0	3
## Puffed_Wheat	10.0	0	50	0	3
## Quaker_Oat_Squares	14.0	6	110	25	3
## Raisin_Bran	14.0	12	240	25	2
## Raisin_Nut_Bran	10.5	8	140	25	3
## Raisin_Squares	15.0	6	110	25	3
## Rice_Chex	23.0	2	30	25	1
## Rice_Krispies	22.0	3	35	25	1
## Shredded_Wheat	16.0	0	95	0	1
## Shredded_Wheat_'n'Bran	19.0	0	140	0	1
## Shredded_Wheat_spoon_size	20.0	0	120	0	1
## Smacks	9.0	15	40	25	2
## Special_K	16.0	3	55	25	1
## Strawberry_Fruit_Wheats	15.0	5	90	25	2
## Total_Corn_Flakes	21.0	3	35	100	3
## Total_Raisin_Bran	15.0	14	230	100	3
## Total_Whole_Grain	16.0	3	110	100	3
## Triples	21.0	3	60	25	3
## Trix	13.0	12	25	25	2
## Wheat_Chex	17.0	3	115	25	1
## Wheaties	17.0	3	110	25	1
## Wheaties_Honey_Gold	16.0	8	60	25	1
##	weight	cups	rating		
## 100%_Bran	1.00	0.33	68.40297		
## 100%_Natural_Bran	1.00	1.00	33.98368		

## All-Bran	1.00	0.33	59.42551
## All-Bran_with_Extra_Fiber	1.00	0.50	93.70491
## Apple_Cinnamon_Cheerios	1.00	0.75	29.50954
## Apple_Jacks	1.00	1.00	33.17409
## Basic_4	1.33	0.75	37.03856
## Bran_Chex	1.00	0.67	49.12025
## Bran_Flakes	1.00	0.67	53.31381
## Cap'n'Crunch	1.00	0.75	18.04285
## Cheerios	1.00	1.25	50.76500
## Cinnamon_Toast_Crunch	1.00	0.75	19.82357
## Clusters	1.00	0.50	40.40021
## Cocoa_Puffs	1.00	1.00	22.73645
## Corn_Chex	1.00	1.00	41.44502
## Corn_Flakes	1.00	1.00	45.86332
## Corn_Pops	1.00	1.00	35.78279
## Count_Chocula	1.00	1.00	22.39651
## Cracklin'_Oat_Bran	1.00	0.50	40.44877
## Crispix	1.00	1.00	46.89564
## Crispy_Wheat_&_Raisins	1.00	0.75	36.17620
## Double_Chex	1.00	0.75	44.33086
## Froot_Loops	1.00	1.00	32.20758
## Frosted_Flakes	1.00	0.75	31.43597
## Frosted_Mini-Wheats	1.00	0.80	58.34514
## Fruit_&_Fibre_Dates,_Walnuts,_and_Oats	1.25	0.67	40.91705
## Fruitful_Bran	1.33	0.67	41.01549
## Fruity_Pebbles	1.00	0.75	28.02576
## Golden_Crisp	1.00	0.88	35.25244
## Golden_Grahams	1.00	0.75	23.80404
## Grape_Nuts_Flakes	1.00	0.88	52.07690
## Grape-Nuts	1.00	0.25	53.37101
## Great_Grains_Pecan	1.00	0.33	45.81172
## Honey_Graham_Ohs	1.00	1.00	21.87129
## Honey_Nut_Cheerios	1.00	0.75	31.07222
## Honey-comb	1.00	1.33	28.74241
## Just_Right_Crunchy__Nuggets	1.00	1.00	36.52368
## Just_Right_Fruit_&_Nut	1.30	0.75	36.47151
## Kix	1.00	1.50	39.24111
## Life	1.00	0.67	45.32807
## Lucky_Charms	1.00	1.00	26.73451
## Maypo	1.00	1.00	54.85092
## Muesli_Raisins,_Dates,_&_Almonds	1.00	1.00	37.13686
## Muesli_Raisins,_Peaches,_&_Pecans	1.00	1.00	34.13976
## Mueslix_Crispy_Blend	1.50	0.67	30.31335
## Multi-Grain_Cheerios	1.00	1.00	40.10596
## Nut&Honey_Crunch	1.00	0.67	29.92429
## Nutri-Grain_Almond-Raisin	1.33	0.67	40.69232
## Nutri-grain_Wheat	1.00	1.00	59.64284
## Oatmeal_Raisin_Crisp	1.25	0.50	30.45084
## Post_Nat._Raisin_Bran	1.33	0.67	37.84059
## Product_19	1.00	1.00	41.50354
## Puffed_Rice	0.50	1.00	60.75611
## Puffed_Wheat	0.50	1.00	63.00565
## Quaker_Oat_Squares	1.00	0.50	49.51187
## Raisin_Bran	1.33	0.75	39.25920

```
## Raisin_Nut_Bran      1.00 0.50 39.70340
## Raisin_Squares      1.00 0.50 55.33314
## Rice_Chex           1.00 1.13 41.99893
## Rice_Krispies       1.00 1.00 40.56016
## Shredded_Wheat      0.83 1.00 68.23588
## Shredded_Wheat_'n'Bran 1.00 0.67 74.47295
## Shredded_Wheat_spoon_size 1.00 0.67 72.80179
## Smacks              1.00 0.75 31.23005
## Special_K           1.00 1.00 53.13132
## Strawberry_Fruit_Wheats 1.00 1.00 59.36399
## Total_Corn_Flakes    1.00 1.00 38.83975
## Total_Raisin_Bran    1.50 1.00 28.59278
## Total_Whole_Grain    1.00 1.00 46.65884
## Triples             1.00 0.75 39.10617
## Trix                1.00 1.00 27.75330
## Wheat_Chex          1.00 0.67 49.78744
## Wheaties            1.00 1.00 51.59219
## Wheaties_Honey_Gold 1.00 0.75 36.18756
```

```
#Removing the type column
Cereals <- Cereals[,-1]
Cereals
```

```
##      calories protein fat sodium fiber carbo
## 100%_Bran      70      4  1   130  10.0   5.0
## 100%_Natural_Bran 120      3  5    15   2.0   8.0
## All-Bran       70      4  1   260   9.0   7.0
## All-Bran_with_Extra_Fiber 50      4  0   140  14.0   8.0
## Apple_Cinnamon_Cheerios 110      2  2   180   1.5  10.5
## Apple_Jacks    110      2  0   125   1.0  11.0
## Basic_4        130      3  2   210   2.0  18.0
## Bran_Chex      90      2  1   200   4.0  15.0
## Bran_Flakes    90      3  0   210   5.0  13.0
## Cap'n'Crunch   120      1  2   220   0.0  12.0
## Cheerios       110      6  2   290   2.0  17.0
## Cinnamon_Toast_Crunch 120      1  3   210   0.0  13.0
## Clusters       110      3  2   140   2.0  13.0
## Cocoa_Puffs    110      1  1   180   0.0  12.0
## Corn_Chex      110      2  0   280   0.0  22.0
## Corn_Flakes    100      2  0   290   1.0  21.0
## Corn_Pops      110      1  0    90   1.0  13.0
## Count_Chocula  110      1  1   180   0.0  12.0
## Cracklin'_Oat_Bran 110      3  3   140   4.0  10.0
## Crispix        110      2  0   220   1.0  21.0
## Crispy_Wheat_&_Raisins 100      2  1   140   2.0  11.0
## Double_Chex    100      2  0   190   1.0  18.0
## Froot_Loops    110      2  1   125   1.0  11.0
## Frosted_Flakes  110      1  0   200   1.0  14.0
## Frosted_Mini-Wheats 100      3  0    0   3.0  14.0
## Fruit_&_Fibre_Dates,_Walnuts,_and_Oats 120      3  2   160   5.0  12.0
## Fruitful_Bran   120      3  0   240   5.0  14.0
## Fruity_Pebbles  110      1  1   135   0.0  13.0
## Golden_Crisp    100      2  0    45   0.0  11.0
## Golden_Grahams  110      1  1   280   0.0  15.0
```



## Grape_Nuts_Flakes	100	3	1	140	3.0	15.0
## Grape-Nuts	110	3	0	170	3.0	17.0
## Great_Grains_Pecan	120	3	3	75	3.0	13.0
## Honey_Graham_Ohs	120	1	2	220	1.0	12.0
## Honey_Nut_Cheerios	110	3	1	250	1.5	11.5
## Honey-comb	110	1	0	180	0.0	14.0
## Just_Right_Crunchy__Nuggets	110	2	1	170	1.0	17.0
## Just_Right_Fruit_&_Nut	140	3	1	170	2.0	20.0
## Kix	110	2	1	260	0.0	21.0
## Life	100	4	2	150	2.0	12.0
## Lucky_Charms	110	2	1	180	0.0	12.0
## Maypo	100	4	1	0	0.0	16.0
## Muesli_Raisins,_Dates,_&_Almonds	150	4	3	95	3.0	16.0
## Muesli_Raisins,_Peaches,_&_Pecans	150	4	3	150	3.0	16.0
## Mueslix_Crispy_Blend	160	3	2	150	3.0	17.0
## Multi-Grain_Cheerios	100	2	1	220	2.0	15.0
## Nut&Honey_Crunch	120	2	1	190	0.0	15.0
## Nutri-Grain_Almond-Raisin	140	3	2	220	3.0	21.0
## Nutri-grain_Wheat	90	3	0	170	3.0	18.0
## Oatmeal_Raisin_Crisp	130	3	2	170	1.5	13.5
## Post_Nat._Raisin_Bran	120	3	1	200	6.0	11.0
## Product_19	100	3	0	320	1.0	20.0
## Puffed_Rice	50	1	0	0	0.0	13.0
## Puffed_Wheat	50	2	0	0	1.0	10.0
## Quaker_Oat_Squares	100	4	1	135	2.0	14.0
## Raisin_Bran	120	3	1	210	5.0	14.0
## Raisin_Nut_Bran	100	3	2	140	2.5	10.5
## Raisin_Squares	90	2	0	0	2.0	15.0
## Rice_Chex	110	1	0	240	0.0	23.0
## Rice_Krispies	110	2	0	290	0.0	22.0
## Shredded_Wheat	80	2	0	0	3.0	16.0
## Shredded_Wheat_'n'Bran	90	3	0	0	4.0	19.0
## Shredded_Wheat_spoon_size	90	3	0	0	3.0	20.0
## Smacks	110	2	1	70	1.0	9.0
## Special_K	110	6	0	230	1.0	16.0
## Strawberry_Fruit_Wheats	90	2	0	15	3.0	15.0
## Total_Corn_Flakes	110	2	1	200	0.0	21.0
## Total_Raisin_Bran	140	3	1	190	4.0	15.0
## Total_Whole_Grain	100	3	1	200	3.0	16.0
## Triples	110	2	1	250	0.0	21.0
## Trix	110	1	1	140	0.0	13.0
## Wheat_Chex	100	3	1	230	3.0	17.0
## Wheaties	100	3	1	200	3.0	17.0
## Wheaties_Honey_Gold	110	2	1	200	1.0	16.0
##						
	sugars	potass	vitamins	shelf	weight	cups
## 100%_Bran	6	280	25	3	1.00	0.33
## 100%_Natural_Bran	8	135	0	3	1.00	1.00
## All-Bran	5	320	25	3	1.00	0.33
## All-Bran_with_Extra_Fiber	0	330	25	3	1.00	0.50
## Apple_Cinnamon_Cheerios	10	70	25	1	1.00	0.75
## Apple_Jacks	14	30	25	2	1.00	1.00
## Basic_4	8	100	25	3	1.33	0.75
## Bran_Chex	6	125	25	1	1.00	0.67
## Bran_Flakes	5	190	25	3	1.00	0.67

## Cap'n'Crunch	12	35	25	2	1.00	0.75
## Cheerios	1	105	25	1	1.00	1.25
## Cinnamon_Toast_Crunch	9	45	25	2	1.00	0.75
## Clusters	7	105	25	3	1.00	0.50
## Cocoa_Puffs	13	55	25	2	1.00	1.00
## Corn_Chex	3	25	25	1	1.00	1.00
## Corn_Flakes	2	35	25	1	1.00	1.00
## Corn_Pops	12	20	25	2	1.00	1.00
## Count_Chocula	13	65	25	2	1.00	1.00
## Cracklin'_Oat_Bran	7	160	25	3	1.00	0.50
## Crispix	3	30	25	3	1.00	1.00
## Crispy_Wheat_&_Raisins	10	120	25	3	1.00	0.75
## Double_Chex	5	80	25	3	1.00	0.75
## Froot_Loops	13	30	25	2	1.00	1.00
## Frosted_Flakes	11	25	25	1	1.00	0.75
## Frosted_Mini-Wheats	7	100	25	2	1.00	0.80
## Fruit_&_Fibre_Dates,_Walnuts,_and_Oats	10	200	25	3	1.25	0.67
## Fruitful_Bran	12	190	25	3	1.33	0.67
## Fruity_Pebbles	12	25	25	2	1.00	0.75
## Golden_Crisp	15	40	25	1	1.00	0.88
## Golden_Grahams	9	45	25	2	1.00	0.75
## Grape_Nuts_Flakes	5	85	25	3	1.00	0.88
## Grape-Nuts	3	90	25	3	1.00	0.25
## Great_Grains_Pecan	4	100	25	3	1.00	0.33
## Honey_Graham_Ohs	11	45	25	2	1.00	1.00
## Honey_Nut_Cheerios	10	90	25	1	1.00	0.75
## Honey-comb	11	35	25	1	1.00	1.33
## Just_Right_Crunchy__Nuggets	6	60	100	3	1.00	1.00
## Just_Right_Fruit_&_Nut	9	95	100	3	1.30	0.75
## Kix	3	40	25	2	1.00	1.50
## Life	6	95	25	2	1.00	0.67
## Lucky_Charms	12	55	25	2	1.00	1.00
## Maypo	3	95	25	2	1.00	1.00
## Muesli_Raisins,_Dates,_&_Almonds	11	170	25	3	1.00	1.00
## Muesli_Raisins,_Peaches,_&_Pecans	11	170	25	3	1.00	1.00
## Mueslix_Crispy_Blend	13	160	25	3	1.50	0.67
## Multi-Grain_Cheerios	6	90	25	1	1.00	1.00
## Nut&Honey_Crunch	9	40	25	2	1.00	0.67
## Nutri-Grain_Almond-Raisin	7	130	25	3	1.33	0.67
## Nutri-grain_Wheat	2	90	25	3	1.00	1.00
## Oatmeal_Raisin_Crisp	10	120	25	3	1.25	0.50
## Post_Nat._Raisin_Bran	14	260	25	3	1.33	0.67
## Product_19	3	45	100	3	1.00	1.00
## Puffed_Rice	0	15	0	3	0.50	1.00
## Puffed_Wheat	0	50	0	3	0.50	1.00
## Quaker_Oat_Squares	6	110	25	3	1.00	0.50
## Raisin_Bran	12	240	25	2	1.33	0.75
## Raisin_Nut_Bran	8	140	25	3	1.00	0.50
## Raisin_Squares	6	110	25	3	1.00	0.50
## Rice_Chex	2	30	25	1	1.00	1.13
## Rice_Krispies	3	35	25	1	1.00	1.00
## Shredded_Wheat	0	95	0	1	0.83	1.00
## Shredded_Wheat_'n'Bran	0	140	0	1	1.00	0.67
## Shredded_Wheat_spoon_size	0	120	0	1	1.00	0.67

## Smacks	15	40	25	2	1.00	0.75
## Special_K	3	55	25	1	1.00	1.00
## Strawberry_Fruit_Wheats	5	90	25	2	1.00	1.00
## Total_Corn_Flakes	3	35	100	3	1.00	1.00
## Total_Raisin_Bran	14	230	100	3	1.50	1.00
## Total_Whole_Grain	3	110	100	3	1.00	1.00
## Triples	3	60	25	3	1.00	0.75
## Trix	12	25	25	2	1.00	1.00
## Wheat_Chex	3	115	25	1	1.00	0.67
## Wheaties	3	110	25	1	1.00	1.00
## Wheaties_Honey_Gold	8	60	25	1	1.00	0.75
##	rating					
## 100%_Bran	68.40297					
## 100%_Natural_Bran	33.98368					
## All-Bran	59.42551					
## All-Bran_with_Extra_Fiber	93.70491					
## Apple_Cinnamon_Cheerios	29.50954					
## Apple_Jacks	33.17409					
## Basic_4	37.03856					
## Bran_Chex	49.12025					
## Bran_Flakes	53.31381					
## Cap'n'_Crunch	18.04285					
## Cheerios	50.76500					
## Cinnamon_Toast_Crunch	19.82357					
## Clusters	40.40021					
## Cocoa_Puffs	22.73645					
## Corn_Chex	41.44502					
## Corn_Flakes	45.86332					
## Corn_Pops	35.78279					
## Count_Chocula	22.39651					
## Cracklin'_Oat_Bran	40.44877					
## Crispix	46.89564					
## Crispy_Wheat_&_Raisins	36.17620					
## Double_Chex	44.33086					
## Froot_Loops	32.20758					
## Frosted_Flakes	31.43597					
## Frosted_Mini-Wheats	58.34514					
## Fruit_&_Fibre_Dates,_Walnuts,_and_Oats	40.91705					
## Fruitful_Bran	41.01549					
## Fruity_Pebbles	28.02576					
## Golden_Crisp	35.25244					
## Golden_Grahams	23.80404					
## Grape_Nuts_Flakes	52.07690					
## Grape-Nuts	53.37101					
## Great_Grains_Pecan	45.81172					
## Honey_Graham_Ohs	21.87129					
## Honey_Nut_Cheerios	31.07222					
## Honey-comb	28.74241					
## Just_Right_Crunchy__Nuggets	36.52368					
## Just_Right_Fruit_&_Nut	36.47151					
## Kix	39.24111					
## Life	45.32807					
## Lucky_Charms	26.73451					
## Maypo	54.85092					

```
## Muesli_Raisins,_Dates,_&_Almonds      37.13686
## Muesli_Raisins,_Peaches,_&_Pecans      34.13976
## Mueslix_Crispy_Blend                   30.31335
## Multi-Grain_Cheerios                   40.10596
## Nut&Honey_Crunch                       29.92429
## Nutri-Grain_Almond-Raisin              40.69232
## Nutri-grain_Wheat                      59.64284
## Oatmeal_Raisin_Crisp                   30.45084
## Post_Nat._Raisin_Bran                  37.84059
## Product_19                             41.50354
## Puffed_Rice                            60.75611
## Puffed_Wheat                           63.00565
## Quaker_Oat_Squares                     49.51187
## Raisin_Bran                            39.25920
## Raisin_Nut_Bran                        39.70340
## Raisin_Squares                         55.33314
## Rice_Chex                              41.99893
## Rice_Krispies                          40.56016
## Shredded_Wheat                         68.23588
## Shredded_Wheat_ 'n' Bran               74.47295
## Shredded_Wheat_spoon_size              72.80179
## Smacks                                 31.23005
## Special_K                              53.13132
## Strawberry_Fruit_Wheats                59.36399
## Total_Corn_Flakes                      38.83975
## Total_Raisin_Bran                      28.59278
## Total_Whole_Grain                      46.65884
## Triples                                39.10617
## Trix                                   27.75330
## Wheat_Chex                             49.78744
## Wheaties                               51.59219
## Wheaties_Honey_Gold                    36.18756
```

##Question 1 Calculating the euclidean distance

```
# normalization of the input variables
Cereals.norm <- sapply(Cereals, scale)

# add row names to Cereals
row.names(Cereals.norm) <- row.names(Cereals)

# Calculation of the euclidean distance
d.norm <- dist(Cereals.norm, method = "euclidean")
```

##Question 2 and 3 working with clusters

```
# Scatter plot
CerealsKM<-kmeans(Cereals.norm, 6)
#there are 6 clusters

plot(c(0), xaxt = 'n', ylab = "", type = "l", ylim =
      c(min(CerealsKM$centers), max(CerealsKM$centers)), xlim = c(0, 8))
```

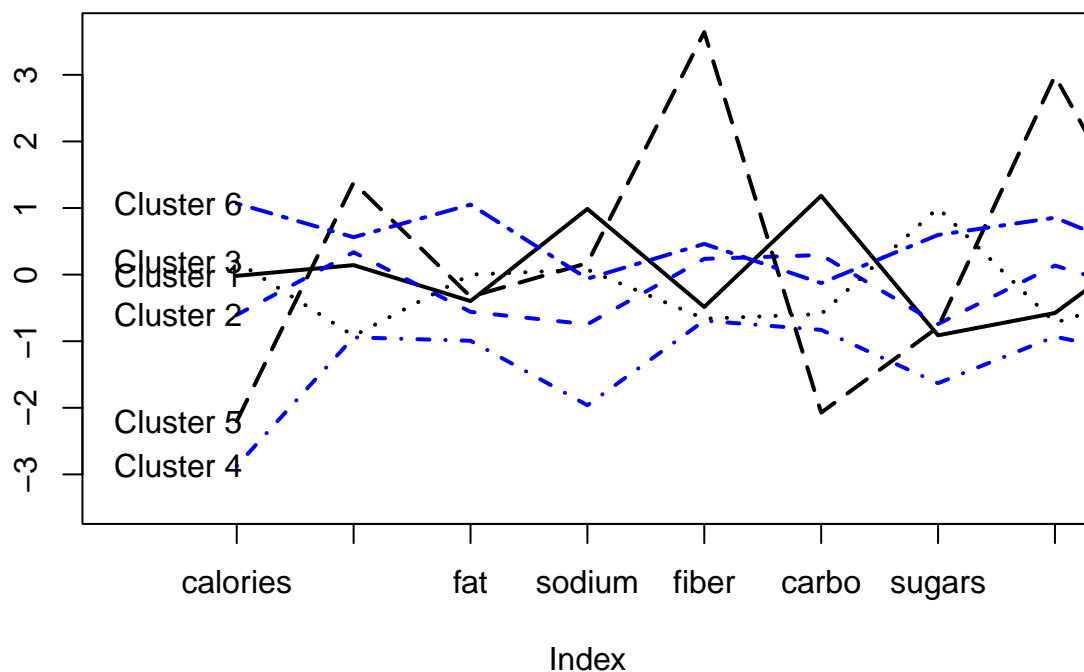
```

# label x-axes
axis(1, at = c(1:13), labels = names(Cereals))

# Graph plot
for (i in c(1:6))
  lines(CerealsKM$centers[i,], lty = i, lwd = 2, col = ifelse(i %in% c(1, 3, 5), "black", "blue"))

# name clusters
text(x = 0.5, y = CerealsKM$centers[, 1], labels = paste("Cluster", c(1:6)))

```



```

#averages of the clusters for each variable
CerealsKM$centers

```

	calories	protein	fat	sodium	fiber	carbo
## 1	-0.01815976	0.1423619	-3.972881e-01	0.98629147	-0.4851366	1.1829364
## 2	-0.60608204	0.3360159	-5.586864e-01	-0.74592272	0.2369920	0.2942873
## 3	0.19781169	-0.9199689	1.057355e-17	0.07498586	-0.6619844	-0.5913029
## 4	-2.87378226	-0.9421007	-9.932203e-01	-1.96164410	-0.6914590	-0.8299074
## 5	-2.20187108	1.3817478	-3.310734e-01	0.17279012	3.6413124	-2.0718749
## 6	1.06875537	0.5615659	1.051645e+00	-0.06055257	0.4615194	-0.1270496

	sugars	potass	vitamins	shelf	weight	cups	rating
## 1	-0.9118315	-0.5762924	0.7152460	-0.4200976	-0.2008324	0.9349344	0.0886145
## 2	-0.7416897	0.1356048	-0.3920972	-0.1096260	-0.2700888	-0.3833931	0.9884157
## 3	1.0020580	-0.7214096	-0.1818422	-0.5460032	-0.2008324	0.2274628	-0.9769810
## 4	-1.6306324	-0.9313592	-1.3032024	0.9419715	-3.4599552	0.7567534	1.3901590

```
## 5 -0.7894824  2.9837813 -0.1818422  0.9419715 -0.2008324 -1.8452553  2.2426479
## 6  0.5959413  0.8550404  0.1479696  0.8712759  1.1219880 -0.5084816 -0.3609136
```

```
#distance between points of the clusters
CerealsKM$withinss
```

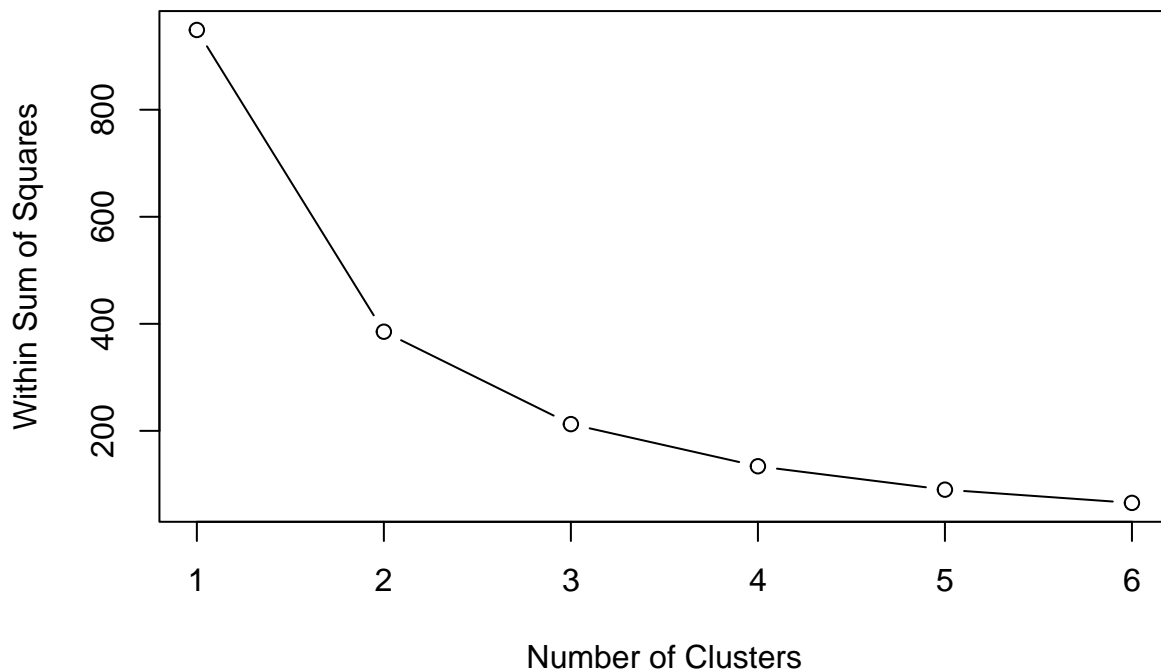
```
## [1] 110.283089  87.937126  61.959068   0.949052  10.476469 134.154091
```

```
#The size of the cluster
CerealsKM$size
```

```
## [1] 15 16 21  2  3 17
```

```
#Calculating the distance between the points of each cluster
wss <- numeric(6)

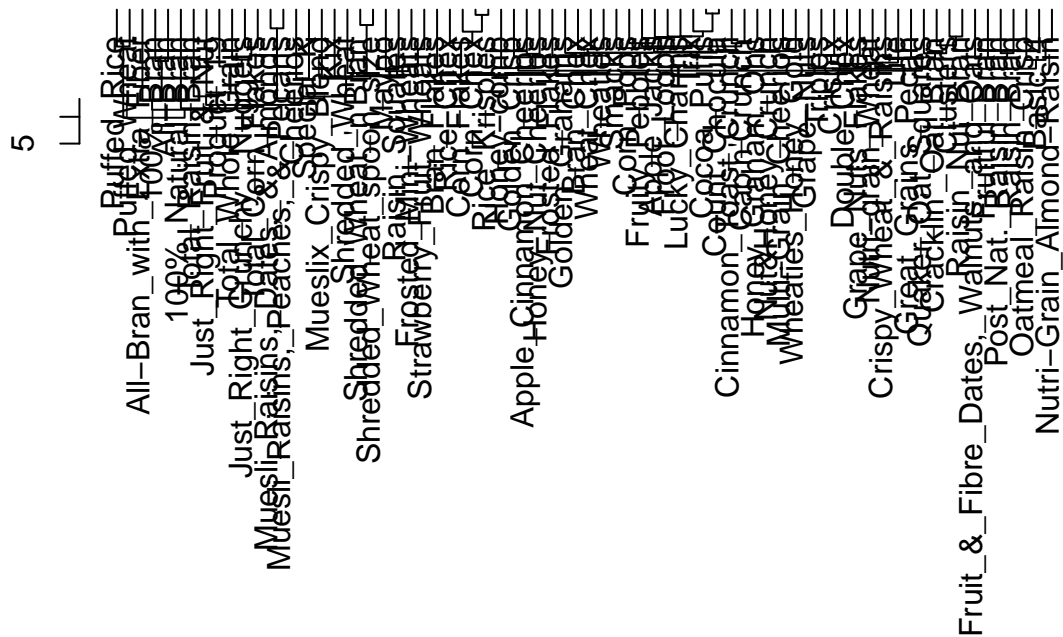
#The mean of the distance between points within a cluster vs number of clusters
for (k in 1:6) wss[k] <- mean(kmeans(Cereals.norm, centers = k, nstart = 25)$withinss)
plot(1:6, wss, type="b", xlab="Number of Clusters", ylab="Within Sum of Squares")
```



```
#SINGLE CLUSTER
hc1 <- hclust(d.norm, method = "single")
hc1
```

```
##
## Call:
## hclust(d = d.norm, method = "single")
##
## Cluster method   : single
## Distance         : euclidean
## Number of objects: 74
```

```
plot(hc1, hang = -1, ann = FALSE)
```



```
#Display 6 clusters
cutree(hc1,k=6)
```

```
##          100%_Bran          100%_Natural_Bran
##                1                2
##          All-Bran          All-Bran_with_Extra_Fiber
##                1                3
##          Apple_Cinnamon_Cheerios          Apple_Jacks
##                4                4
##                Basic_4          Bran_Chex
##                4                4
##          Bran_Flakes          Cap'n'Crunch
##                4                4
##          Cheerios          Cinnamon_Toast_Crunch
##                4                4
```

##	Clusters	Cocoa_Puffs
##	4	4
##	Corn_Chex	Corn_Flakes
##	4	4
##	Corn_Pops	Count_Chocula
##	4	4
##	Cracklin'_Oat_Bran	Crispix
##	4	4
##	Crispy_Wheat_&_Raisins	Double_Chex
##	4	4
##	Froot_Loops	Frosted_Flakes
##	4	4
##	Frosted_Mini-Wheats	Fruit_&_Fibre_Dates,_Walnuts,_and_Oats
##	4	4
##	Fruitful_Bran	Fruity_Pebbles
##	4	4
##	Golden_Crisp	Golden_Grahams
##	4	4
##	Grape_Nuts_Flakes	Grape-Nuts
##	4	4
##	Great_Grains_Pecan	Honey_Graham_Ohs
##	4	4
##	Honey_Nut_Cheerios	Honey-comb
##	4	4
##	Just_Right_Crunchy__Nuggets	Just_Right_Fruit_&_Nut
##	5	5
##	Kix	Life
##	4	4
##	Lucky_Charms	Maypo
##	4	4
##	Muesli_Raisins,_Dates,_&_Almonds	Muesli_Raisins,_Peaches,_&_Pecans
##	4	4
##	Mueslix_Crispy_Blend	Multi-Grain_Cheerios
##	4	4
##	Nut&Honey_Crunch	Nutri-Grain_Almond-Raisin
##	4	4
##	Nutri-grain_Wheat	Oatmeal_Raisin_Crisp
##	4	4
##	Post_Nat._Raisin_Bran	Product_19
##	4	5
##	Puffed_Rice	Puffed_Wheat
##	6	6
##	Quaker_Oat_Squares	Raisin_Bran
##	4	4
##	Raisin_Nut_Bran	Raisin_Squares
##	4	4
##	Rice_Chex	Rice_Krispies
##	4	4
##	Shredded_Wheat	Shredded_Wheat_'n'Bran
##	4	4
##	Shredded_Wheat_spoon_size	Smacks
##	4	4
##	Special_K	Strawberry_Fruit_Wheats
##	4	4



##	Total_Corn_Flakes	Total_Raisin_Bran
##	5	5
##	Total_Whole_Grain	Triples
##	5	4
##	Trix	Wheat_Chex
##	4	4
##	Wheaties	Wheaties_Honey_Gold
##	4	4

```
#Display 10 clusters
cutree (hc1, k=10)
```

##	100%_Bran	100%_Natural_Bran
##	1	2
##	All-Bran	All-Bran_with_Extra_Fiber
##	1	3
##	Apple_Cinnamon_Cheerios	Apple_Jacks
##	4	4
##	Basic_4	Bran_Chex
##	4	4
##	Bran_Flakes	Cap'n'Crunch
##	4	4
##	Cheerios	Cinnamon_Toast_Crunch
##	5	4
##	Clusters	Cocoa_Puffs
##	4	4
##	Corn_Chex	Corn_Flakes
##	4	4
##	Corn_Pops	Count_Chocula
##	4	4
##	Cracklin'_Oat_Bran	Crispix
##	4	4
##	Crispy_Wheat_&_Raisins	Double_Chex
##	4	4
##	Froot_Loops	Frosted_Flakes
##	4	4
##	Frosted_Mini-Wheats	Fruit_&_Fibre_Dates,_Walnuts,_and_Oats
##	4	4
##	Fruitful_Bran	Fruity_Pebbles
##	4	4
##	Golden_Crisp	Golden_Grahams
##	4	4
##	Grape_Nuts_Flakes	Grape-Nuts
##	4	4
##	Great_Grains_Pecan	Honey_Graham_Ohs
##	4	4
##	Honey_Nut_Cheerios	Honey-comb
##	4	4
##	Just_Right_Crunchy__Nuggets	Just_Right_Fruit_&_Nut
##	6	7
##	Kix	Life
##	4	4
##	Lucky_Charms	Maypo
##	4	4

##	Muesli_Raisins,_Dates,_&_Almonds	Muesli_Raisins,_Peaches,_&_Pecans
##	8	8
##	Mueslix_Crispy_Blend	Multi-Grain_Cheerios
##	4	4
##	Nut&Honey_Crunch	Nutri-Grain_Almond-Raisin
##	4	4
##	Nutri-grain_Wheat	Oatmeal_Raisin_Crisp
##	4	4
##	Post_Nat._Raisin_Bran	Product_19
##	4	6
##	Puffed_Rice	Puffed_Wheat
##	9	9
##	Quaker_Oat_Squares	Raisin_Bran
##	4	4
##	Raisin_Nut_Bran	Raisin_Squares
##	4	4
##	Rice_Chex	Rice_Krispies
##	4	4
##	Shredded_Wheat	Shredded_Wheat_'n'Bran
##	4	4
##	Shredded_Wheat_spoon_size	Smacks
##	4	4
##	Special_K	Strawberry_Fruit_Wheats
##	5	4
##	Total_Corn_Flakes	Total_Raisin_Bran
##	6	10
##	Total_Whole_Grain	Triples
##	6	4
##	Trix	Wheat_Chex
##	4	4
##	Wheaties	Wheaties_Honey_Gold
##	4	4

#### *#COMPLETE CLUSTER*

```
hc2 <- hclust(d.norm, method = "complete")
hc2
```

```
##
## Call:
## hclust(d = d.norm, method = "complete")
##
## Cluster method   : complete
## Distance         : euclidean
## Number of objects: 74
```

```
plot(hc2, hang = -1, ann = FALSE)
```



##		2		2
##	Frosted_Mini-Wheats		Fruit_&_Fibre_Dates,_Walnuts,_and_Oats	
##		1		2
##	Fruitful_Bran		Fruity_Pebbles	
##		2		2
##	Golden_Crisp		Golden_Grahams	
##		2		2
##	Grape_Nuts_Flakes		Grape-Nuts	
##		2		2
##	Great_Grains_Pecan		Honey_Graham_Ohs	
##		2		2
##	Honey_Nut_Cheerios		Honey-comb	
##		2		2
##	Just_Right_Crunchy__Nuggets		Just_Right_Fruit_&_Nut	
##		2		2
##	Kix		Life	
##		2		2
##	Lucky_Charms		Maypo	
##		2		1
##	Muesli_Raisins,_Dates,_&_Almonds		Muesli_Raisins,_Peaches,_&_Pecans	
##		2		2
##	Mueslix_Crispy_Blend		Multi-Grain_Cheerios	
##		2		2
##	Nut&Honey_Crunch		Nutri-Grain_Almond-Raisin	
##		2		2
##	Nutri-grain_Wheat		Oatmeal_Raisin_Crisp	
##		2		2
##	Post_Nat._Raisin_Bran		Product_19	
##		2		2
##	Puffed_Rice		Puffed_Wheat	
##		1		1
##	Quaker_Oat_Squares		Raisin_Bran	
##		2		2
##	Raisin_Nut_Bran		Raisin_Squares	
##		2		1
##	Rice_Chex		Rice_Krispies	
##		2		2
##	Shredded_Wheat		Shredded_Wheat_'n'Bran	
##		1		1
##	Shredded_Wheat_spoon_size		Smacks	
##		1		2
##	Special_K		Strawberry_Fruit_Wheats	
##		2		1
##	Total_Corn_Flakes		Total_Raisin_Bran	
##		2		2
##	Total_Whole_Grain		Triples	
##		2		2
##	Trix		Wheat_Chex	
##		2		2
##	Wheaties		Wheaties_Honey_Gold	
##		2		2

```
#Displaying the 6 clusters
cutree (hc2, k=5)
```

##	100%_Bran	100%_Natural_Bran
##	1	2
##	All-Bran	All-Bran_with_Extra_Fiber
##	1	1
##	Apple_Cinnamon_Cheerios	Apple_Jacks
##	3	3
##	Basic_4	Bran_Chex
##	4	3
##	Bran_Flakes	Cap'n'Crunch
##	3	3
##	Cheerios	Cinnamon_Toast_Crunch
##	3	3
##	Clusters	Cocoa_Puffs
##	3	3
##	Corn_Chex	Corn_Flakes
##	3	3
##	Corn_Pops	Count_Chocula
##	3	3
##	Cracklin'_Oat_Bran	Crispix
##	3	3
##	Crispy_Wheat_&_Raisins	Double_Chex
##	3	3
##	Froot_Loops	Frosted_Flakes
##	3	3
##	Frosted_Mini-Wheats	Fruit_&_Fibre_Dates,_Walnuts,_and_Oats
##	5	4
##	Fruitful_Bran	Fruity_Pebbles
##	4	3
##	Golden_Crisp	Golden_Grahams
##	3	3
##	Grape_Nuts_Flakes	Grape-Nuts
##	3	3
##	Great_Grains_Pecan	Honey_Graham_Ohs
##	3	3
##	Honey_Nut_Cheerios	Honey-comb
##	3	3
##	Just_Right_Crunchy__Nuggets	Just_Right_Fruit_&_Nut
##	3	4
##	Kix	Life
##	3	3
##	Lucky_Charms	Maypo
##	3	5
##	Muesli_Raisins,_Dates,_&_Almonds	Muesli_Raisins,_Peaches,_&_Pecans
##	4	4
##	Mueslix_Crispy_Blend	Multi-Grain_Cheerios
##	4	3
##	Nut&Honey_Crunch	Nutri-Grain_Almond-Raisin
##	3	4
##	Nutri-grain_Wheat	Oatmeal_Raisin_Crisp
##	3	4
##	Post_Nat._Raisin_Bran	Product_19
##	4	3
##	Puffed_Rice	Puffed_Wheat
##	5	5

##	Quaker_Oat_Squares	Raisin_Bran
##	3	4
##	Raisin_Nut_Bran	Raisin_Squares
##	3	5
##	Rice_Chex	Rice_Krispies
##	3	3
##	Shredded_Wheat	Shredded_Wheat_'n'Bran
##	5	5
##	Shredded_Wheat_spoon_size	Smacks
##	5	3
##	Special_K	Strawberry_Fruit_Wheats
##	3	5
##	Total_Corn_Flakes	Total_Raisin_Bran
##	3	4
##	Total_Whole_Grain	Triples
##	3	3
##	Trix	Wheat_Chex
##	3	3
##	Wheaties	Wheaties_Honey_Gold
##	3	3

##Question 4

*#This shows that the data should not be normalized. The cluster for the healthy cereals should be a*