R_Assignment - Group1

R Markdown

This is an R Markdown document. Markdown is a simple formatting syntax for authoring HTML, PDF, and MS Word documents. For more details on using R Markdown see http://rmarkdown.rstudio.com.

When you click the **Knit** button a document will be generated that includes both content as well as the output of any embedded R code chunks within the document. You can embed an R code chunk like this:

Using the data provided by one of my professors in the analytics program. I do not have a link but only csv file.

This code works perfectly on my machine, as i have this file in a same folder but if it does not work on your end, you could simply import it.

```
Cereals <- read.csv("Cereals.csv", header=TRUE)
```

Q1. Provide a introduction of your analysis in the .RMD file so it can be produced in the output.

Introduction to dataset:

##The following dataset contains the different nutritional values for various cereal brands. Using this data, we can find out that which cereals are best healthwise. Moreover, looking at different variables like sodium, fat, protein, carbohydrates, we can presumably recommend the best suited cereal brands to the customer according to their needs.

Q2. Print the structure of your dataset.

Cer	reals							
##		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

			_	~		_	•	0.4.0
##		Bran_Flakes	P	С	90	3	0	210
	11	Cap'n'Crunch	Q	С	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	С	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	Н	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	С	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	С	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	•	G	C	110	3	1	250
	38	Honey_Nut_Cheerios						
		Honey-comb	P	C	110	1	0	180
	39	Just_Right_CrunchyNuggets	K	C	110	2	1	170
	40	Just_Right_Fruit_&_Nut	K	C	140	3	1	170
	41	Kix	G	С	110	2	1	260
	42	Life	Q	С	100	4	2	150
##	43	Lucky_Charms	G	С	110	2	1	180
##	44	Maypo	Α	Н	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	С	140	3	2	220
##		_ Nutri-grain_Wheat	K	С	90	3	0	170
##		Oatmeal_Raisin_Crisp	G	C	130	3	2	170
##		Post_NatRaisin_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			50	2	0	
	56 57	_	Q	C				125
##		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
##		Raisin_Squares	K	С	90	2	0	0
	62	Rice_Chex	R	С	110	1	0	240
##	63	Rice_Krispies	K	C	110	2	0	290

##	64				Sì	neat	N	С		80	2	0	0	
##	65			Sh		Wheat_'n'l		N	C		90	3	0	0
##	66					at_spoon_s		N	C		90	3	0	0
##	67					Sma	acks	K	C		110	2	1	70
##	68					Specia	al_K	K	C		110	6	0	230
##	69			Str	awberry_	_Fruit_Wh	eats	N	C		90	2	0	15
##	70				Total	L_Corn_Fla	akes	G	C		110	2	1	200
##	71				Total	l_Raisin_l	Bran	G	C		140	3	1	190
	72				Total	L_Whole_G		G	C		100	3	1	200
	73					_	ples	G	C		110	2	1	250
	74						Γrix	G	C		110	1	1	140
	75					Wheat_0		R	C		100	3	1	230
	76 77				171	Wheat		G	C		100	3	1	200
##	11	£ : 1	1			es_Honey_(G	C		110	2	1	200
## ##	1	10.0	5.0	sugars 6	280	vitamins 25	snell 3		_	_	rating 68.40297			
##		2.0	8.0	8	135	25	3				33.98368			
##		9.0	7.0	5	320	25	3				59.42551			
##		14.0	8.0	0	330	25	3				93.70491			
##		1.0	14.0	8	NA	25	3				34.38484			
##		1.5	10.5	10	70	25	1				29.50954			
##		1.0	11.0	14	30	25	2				33.17409			
##		2.0	18.0	8	100	25	3				37.03856			
##		4.0	15.0	6	125	25	1				49.12025			
##	10	5.0	13.0	5	190	25	3		1.00	0.67	53.31381			
##	11	0.0	12.0	12	35				1.00	0.75	18.04285			
##	12	2.0	17.0	1	105				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				40.40021			
##	15	0.0	12.0	13	55	25	2				22.73645			
##	16	0.0	22.0	3	25	25	1				41.44502			
##	17	1.0	21.0	2	35	25	1				45.86332			
##	18	1.0	13.0	12	20	25	2				35.78279			
##	19	0.0	12.0	13	65	25	2				22.39651			
## ##	20 21	4.0 1.0	10.0 21.0	7 0	160 NA	25 0	3 2				40.44877 64.53382			
	22	1.0	21.0	3	30	25	3				46.89564			
	23	2.0	11.0	10	120	25	3				36.17620			
	24	1.0	18.0	5	80	25	3				44.33086			
	25	1.0	11.0	13	30	25	2				32.20758			
	26	1.0	14.0	11	25	25	1				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				35.25244			
	32	0.0	15.0	9	45	25	2				23.80404			
	33	3.0	15.0	5	85	25	3				52.07690			
	34	3.0	17.0	3	90	25	3				53.37101			
	35	3.0	13.0	4	100	25	3				45.81172			
	36	1.0	12.0	11	45	25	2				21.87129			
	37 38	1.5	11.5 14.0	10 11	90 35	25 25	1 1				31.07222 28.74241			
	39	1.0	17.0	6	60	100	3				36.52368			
пπ		1.0	11.0	J	00	100	3		1.00	1.00	55.02500			

```
## 40
         2.0
              20.0
                          9
                                95
                                         100
                                                       1.30 0.75 36.47151
                          3
## 41
         0.0
              21.0
                                40
                                          25
                                                  2
                                                       1.00 1.50 39.24111
##
   42
         2.0
              12.0
                          6
                                95
                                          25
                                                       1.00 0.67 45.32807
                                          25
   43
              12.0
                                                  2
##
         0.0
                        12
                                55
                                                       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
                                          25
                                                  3
                                                       1.00 1.00 37.13686
                               170
                                                  3
##
  46
         3.0
              16.0
                        11
                               170
                                          25
                                                       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
                          2
                                           25
##
   51
         3.0
              18.0
                                90
                                                  3
                                                       1.00 1.00 59.64284
##
   52
         1.5
              13.5
                        10
                                          25
                                                  3
                                                       1.25 0.50 30.45084
                               120
                                                  3
## 53
         6.0
              11.0
                        14
                               260
                                           25
                                                       1.33 0.67 37.84059
## 54
              20.0
                         3
                                         100
                                                  3
         1.0
                                45
                                                       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
                                           0
                                                  3
                                                       0.50 1.00 63.00565
                                50
##
   57
         2.0
              14.0
                         6
                                           25
                                                  3
                                                       1.00 0.50 49.51187
                               110
##
  58
         2.7
                NA
                                           0
                                                       1.00 0.67 50.82839
                        NA
                               110
                                                  1
##
   59
         5.0
              14.0
                        12
                               240
                                          25
                                                  2
                                                       1.33 0.75 39.25920
##
   60
         2.5
              10.5
                         8
                                           25
                                                  3
                                                       1.00 0.50 39.70340
                               140
## 61
                          6
                                           25
                                                  3
                                                       1.00 0.50 55.33314
         2.0
              15.0
                               110
              23.0
                          2
## 62
         0.0
                                30
                                          25
                                                  1
                                                       1.00 1.13 41.99893
                          3
                                           25
## 63
         0.0
              22.0
                                35
                                                  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
              20.0
                          0
                               120
                                           0
                                                       1.00 0.67 72.80179
##
         3.0
                                                  1
                                           25
                                                  2
##
   67
         1.0
               9.0
                        15
                                40
                                                       1.00 0.75 31.23005
   68
                          3
                                           25
                                                  1
##
         1.0
              16.0
                                55
                                                       1.00 1.00 53.13132
                                                  2
## 69
         3.0
              15.0
                          5
                                90
                                          25
                                                       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
                          3
##
   72
         3.0
              16.0
                               110
                                         100
                                                  3
                                                       1.00 1.00 46.65884
                         3
                                          25
##
   73
         0.0
              21.0
                                60
                                                  3
                                                       1.00 0.75 39.10617
##
   74
         0.0
              13.0
                        12
                                25
                                          25
                                                  2
                                                       1.00 1.00 27.75330
                         3
                                          25
## 75
         3.0
              17.0
                               115
                                                  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
                                          25
                                                       1.00 0.75 36.18756
                                60
```

Q3. List the variables in your dataset.

[13] "shelf"

```
names (Cereals)
    [1]
##
        "name"
                     "mfr"
                                  "type"
                                              "calories"
                                                          "protein"
                                                                       "fat"
        "sodium"
                     "fiber"
##
    [7]
                                  "carbo"
                                                                       "vitamins"
                                              "sugars"
                                                           "potass"
```

"cups"

Q4. Print the top 15 rows of your dataset.

"weight"

"rating"

```
head(Cereals, n=15)
##
                              name mfr type calories protein fat sodium fiber carbo
## 1
                        100%_Bran
                                      N
                                           С
                                                     70
                                                               4
                                                                               10.0
                                                                                       5.0
                                                                   1
                                                                         130
                                            С
## 2
               100%_Natural_Bran
                                      Q
                                                    120
                                                               3
                                                                   5
                                                                          15
                                                                                2.0
                                                                                       8.0
                                           C
                                                     70
                                                                                      7.0
## 3
                          All-Bran
                                      K
                                                               4
                                                                   1
                                                                         260
                                                                                9.0
## 4
      All-Bran_with_Extra_Fiber
                                      K
                                           C
                                                     50
                                                               4
                                                                   0
                                                                         140
                                                                               14.0
                                                                                      8.0
                                           С
## 5
                                      R
                                                               2
                                                                   2
                                                                         200
                                                                                1.0
                   Almond_Delight
                                                    110
                                                                                     14.0
## 6
                                      G
                                           C
                                                               2
                                                                   2
         Apple_Cinnamon_Cheerios
                                                    110
                                                                         180
                                                                                1.5
                                                                                     10.5
## 7
                                           C
                      Apple_Jacks
                                      K
                                                    110
                                                               2
                                                                   0
                                                                         125
                                                                                1.0
                                                                                     11.0
## 8
                           Basic 4
                                      G
                                           C
                                                    130
                                                               3
                                                                   2
                                                                         210
                                                                                2.0
                                                                                     18.0
## 9
                        Bran_Chex
                                      R
                                           C
                                                    90
                                                               2
                                                                   1
                                                                         200
                                                                                4.0
                                                                                     15.0
## 10
                      Bran_Flakes
                                      P
                                           C
                                                    90
                                                               3
                                                                   0
                                                                         210
                                                                                5.0
                                                                                     13.0
                                           C
                                                                   2
                                                                         220
## 11
                     Cap'n'Crunch
                                      Q
                                                    120
                                                               1
                                                                                0.0
                                                                                     12.0
## 12
                                      G
                                           C
                                                    110
                                                               6
                                                                   2
                                                                         290
                                                                                2.0
                                                                                     17.0
                          Cheerios
                                      G
## 13
           Cinnamon_Toast_Crunch
                                            С
                                                    120
                                                               1
                                                                   3
                                                                         210
                                                                                0.0
                                                                                     13.0
## 14
                          Clusters
                                      G
                                            С
                                                    110
                                                               3
                                                                   2
                                                                                2.0
                                                                                     13.0
                                                                         140
                                      G
                                            C
## 15
                      Cocoa_Puffs
                                                    110
                                                               1
                                                                   1
                                                                         180
                                                                                0.0
                                                                                     12.0
##
      sugars potass vitamins shelf weight cups
                                                       rating
## 1
                  280
                             25
                                     3
                                         1.00 0.33 68.40297
            6
##
  2
            8
                  135
                              0
                                     3
                                         1.00 1.00 33.98368
## 3
            5
                  320
                             25
                                     3
                                         1.00 0.33 59.42551
## 4
            0
                             25
                  330
                                     3
                                         1.00 0.50 93.70491
## 5
            8
                   NA
                             25
                                     3
                                         1.00 0.75 34.38484
## 6
           10
                             25
                   70
                                         1.00 0.75 29.50954
                                     1
## 7
           14
                             25
                                     2
                                         1.00 1.00 33.17409
                   30
## 8
            8
                  100
                             25
                                     3
                                         1.33 0.75 37.03856
## 9
            6
                  125
                             25
                                     1
                                         1.00 0.67 49.12025
## 10
            5
                             25
                                         1.00 0.67 53.31381
                  190
                                     3
## 11
           12
                   35
                             25
                                     2
                                         1.00 0.75 18.04285
## 12
            1
                  105
                             25
                                     1
                                         1.00 1.25 50.76500
## 13
            9
                   45
                             25
                                     2
                                         1.00 0.75 19.82357
            7
                             25
## 14
                  105
                                     3
                                         1.00 0.50 40.40021
## 15
           13
                   55
                             25
                                     2
                                         1.00 1.00 22.73645
```

Q5. Write a user defined function using any of the variables from the data set.

```
Here we are using sodium variable from our dataset, and doing it square.
```

```
sodium_square<-function(x)</pre>
  result=x*x
  result
}
sodium_square(Cereals$sodium)
    [1]
          16900
                    225
                          67600
                                 19600
                                         40000
                                                 32400
                                                                         40000
                                                                                 44100
##
                                                         15625
                                                                 44100
##
   [11]
          48400
                 84100
                          44100
                                 19600
                                         32400
                                                 78400
                                                         84100
                                                                  8100
                                                                         32400
                                                                                 19600
## [21]
           6400
                  48400
                         19600
                                 36100
                                         15625
                                                 40000
                                                              0
                                                                 25600
                                                                         57600
                                                                                 18225
## [31]
           2025
                 78400
                         19600
                                 28900
                                           5625
                                                 48400
                                                         62500
                                                                 32400
                                                                         28900
                                                                                 28900
```

Q6.Use data manipulation techniques and filter rows based on any logical criteria that exist in your dataset.

Here we are filtering our data, we are just considering rows which has sodium more than 130.

```
library(dplyr)
sample1 = filter(Cereals, sodium>100)
sample1
```

##			mfr	type	calories	protein	fat	sodium
##	1	100%_Bran	N	C	70	4	1	130
##	2	All-Bran	K	C	70	4	1	260
##	3	All-Bran_with_Extra_Fiber	K	C	50	4	0	140
##		Almond_Delight	R	C	110	2	2	200
##		Apple_Cinnamon_Cheerios	G	C	110	2	2	180
	6	Apple_Jacks	K	C	110	2	0	125
	7	Basic_4	G	C	130	3	2	210
	8	Bran_Chex	R	C	90	2	1	200
##	9	Bran_Flakes	Р	C	90	3	0	210
##	10	Cap'n'Crunch	Q	C	120	1	2	220
##		Cheerios	G	C	110	6	2	290
##	12	Cinnamon_Toast_Crunch	G	C	120	1	3	210
##	13	Clusters	G	C	110	3	2	140
##	14	Cocoa_Puffs	G	C	110	1	1	180
##	15	Corn_Chex	R	C	110	2	0	280
##	16	Corn_Flakes	K	C	100	2	0	290
##	17	Count_Chocula	G	C	110	1	1	180
##	18	Cracklin'_Oat_Bran	K	C	110	3	3	140
##	19	Crispix	K	C	110	2	0	220
##	20	${\tt Crispy_Wheat_\&_Raisins}$	G	C	100	2	1	140
##	21	Double_Chex	R	C	100	2	0	190
##	22	Froot_Loops	K	C	110	2	1	125
##	23	Frosted_Flakes	K	C	110	1	0	200
##	24	$Fruit_\&_Fibre_Dates,_Walnuts,_and_Oats$	P	C	120	3	2	160
##	25	Fruitful_Bran	K	C	120	3	0	240
##	26	Fruity_Pebbles	P	C	110	1	1	135
##	27	Golden_Grahams	G	C	110	1	1	280
##	28	<pre>Grape_Nuts_Flakes</pre>	P	C	100	3	1	140
##	29	Grape-Nuts	Р	C	110	3	0	170
##	30	${\tt Honey_Graham_Ohs}$	Q	C	120	1	2	220
##	31	${\tt Honey_Nut_Cheerios}$	G	C	110	3	1	250
##	32	Honey-comb	P	C	110	1	0	180
##	33	Just_Right_CrunchyNuggets	K	C	110	2	1	170
##	34	Just_Right_Fruit_&_Nut	K	C	140	3	1	170
##	35	Kix	G	C	110	2	1	260

##	36					Life		Q C		100	4	2	150
	37				L	ucky_Charms		G C		110	2	1	180
##	38	M	luesli_	Raisins		s,_&_Pecans		R C		150	4	3	150
##	39		_			rispy_Blend		K C		160	3	2	150
##	40					in_Cheerios		G C		100	2	1	220
##	41				Nut&H	oney_Crunch		K C		120	2	1	190
##	42			Nutri-	-Grain_Al	mond-Raisin		K C		140	3	2	220
##	43				Nutri-	grain_Wheat		K C		90	3	0	170
##	44			C	Oatmeal_R	aisin_Crisp		G C		130	3	2	170
##	45			Po	st_Nat	Raisin_Bran		P C		120	3	1	200
##	46					Product_19		K C		100	3	0	320
##	47				Quaker_	Oat_Squares		Q C		100	4	1	135
##	48					Raisin_Bran		K C		120	3	1	210
##	49				Rais	in_Nut_Bran		G C		100	3	2	140
	50					Rice_Chex		R C		110	1	0	240
	51				Ri	ce_Krispies		K C		110	2	0	290
	52					Special_K		K C		110	6	0	230
	53				_	Corn_Flakes		G C		110	2	1	200
	54				_	Raisin_Bran		G C		140	3	1	190
	55				Total_	Whole_Grain		G C		100	3	1	200
	56					Triples		G C		110	2	1	250
	57					Trix		G C		110	1	1	140
	58					Wheat_Chex		R C		100	3	1	230
##					T71	Wheaties		G C		100	3 2	1	200
## ##	60	fibon	aamba	a11 ma ma		_Honey_Gold		G C	a	110	2	1	200
##	1	10.0	5.0	Sugars 6	280	itamins she 25	3			rating 68.40297			
##	2	9.0	7.0	5	320	25	3			59.42551			
##	3	14.0	8.0	0	330	25	3			93.70491			
	4	1.0	14.0	8	NA	25	3			34.38484			
##	5	1.5	10.5	10	70	25	1			29.50954			
##	6	1.0	11.0	14	30	25	2			33.17409			
##	7	2.0	18.0	8	100	25	3			37.03856			
##	8	4.0	15.0	6	125	25	1			49.12025			
##	9	5.0	13.0	5	190	25	3	1.00	0.67	53.31381			
##	10	0.0	12.0	12	35	25	2	1.00	0.75	18.04285			
##	11	2.0	17.0	1	105	25	1	1.00	1.25	50.76500			
##	12	0.0	13.0	9	45	25	2	1.00	0.75	19.82357			
##	13	2.0	13.0	7	105	25	3	1.00	0.50	40.40021			
##	14	0.0	12.0	13	55	25	2	1.00	1.00	22.73645			
##		0.0	22.0	3	25	25	1	1.00	1.00	41.44502			
	16	1.0	21.0	2	35	25	1			45.86332			
	17	0.0	12.0	13	65	25	2			22.39651			
	18	4.0	10.0	7	160	25	3			40.44877			
##		1.0	21.0	3	30	25	3			46.89564			
##		2.0	11.0	10	120	25	3			36.17620			
##		1.0	18.0	5	80	25	3			44.33086			
##		1.0	11.0	13	30	25	2			32.20758			
##		1.0	14.0	11	25	25	1			31.43597			
##		5.0	12.0	10	200	25 25	3			40.91705			
## ##		5.0	14.0	12 12	190 25	25 25	3			41.01549			
	26 27	0.0	13.0 15.0	9	25 45	25 25	2			28.02576 23.80404			
##		3.0	15.0	5	45 85	25 25	3			52.07690			
##	20	3.0	10.0	5	00	25	S	1.00	0.00	52.07690			

##	29	3.0	17.0	3	90	25	3	1.00	0.25	53.37101
##	30	1.0	12.0	11	45	25	2	1.00	1.00	21.87129
##	31	1.5	11.5	10	90	25	1	1.00	0.75	31.07222
##	32	0.0	14.0	11	35	25	1	1.00	1.33	28.74241
##	33	1.0	17.0	6	60	100	3	1.00	1.00	36.52368
##	34	2.0	20.0	9	95	100	3	1.30	0.75	36.47151
##	35	0.0	21.0	3	40	25	2	1.00	1.50	39.24111
##	36	2.0	12.0	6	95	25	2	1.00	0.67	45.32807
##	37	0.0	12.0	12	55	25	2	1.00	1.00	26.73451
##	38	3.0	16.0	11	170	25	3	1.00	1.00	34.13976
##	39	3.0	17.0	13	160	25	3	1.50	0.67	30.31335
##	40	2.0	15.0	6	90	25	1	1.00	1.00	40.10596
##	41	0.0	15.0	9	40	25	2	1.00	0.67	29.92429
##	42	3.0	21.0	7	130	25	3	1.33	0.67	40.69232
##	43	3.0	18.0	2	90	25	3	1.00	1.00	59.64284
##	44	1.5	13.5	10	120	25	3	1.25	0.50	30.45084
##	45	6.0	11.0	14	260	25	3	1.33	0.67	37.84059
##	46	1.0	20.0	3	45	100	3	1.00	1.00	41.50354
##	47	2.0	14.0	6	110	25	3	1.00	0.50	49.51187
##	48	5.0	14.0	12	240	25	2	1.33	0.75	39.25920
##	49	2.5	10.5	8	140	25	3	1.00	0.50	39.70340
##	50	0.0	23.0	2	30	25	1	1.00	1.13	41.99893
##	51	0.0	22.0	3	35	25	1	1.00	1.00	40.56016
##	52	1.0	16.0	3	55	25	1	1.00	1.00	53.13132
##	53	0.0	21.0	3	35	100	3	1.00	1.00	38.83975
##	54	4.0	15.0	14	230	100	3	1.50	1.00	28.59278
##	55	3.0	16.0	3	110	100	3	1.00	1.00	46.65884
##	56	0.0	21.0	3	60	25	3	1.00	0.75	39.10617
##	57	0.0	13.0	12	25	25	2	1.00	1.00	27.75330
##	58	3.0	17.0	3	115	25	1	1.00	0.67	49.78744
##	59	3.0	17.0	3	110	25	1	1.00	1.00	51.59219
##	60	1.0	16.0	8	60	25	1	1.00	0.75	36.18756

Q7.Identify the dependent & independent variables and use reshaping techniques and create a new data frame by joining those variables from your dataset

Looking at data, rating (variable) is dependent on all the other variables and all the variables are independent to each other.

Here, we created a new datafrane with total 6 columns.

```
df = data.frame(Cereals %>% select(1:6))
##
                                     name mfr type calories protein fat
## 1
                                 100%_Bran N
                                               С
                                                        70
                                                                 4
                                                                     1
## 2
                         100%_Natural_Bran Q
                                                 С
                                                        120
                                                                 3
                                                                     5
                                  All-Bran K C
## 3
                                                        70
                                                                     1
## 4
                  All-Bran_with_Extra_Fiber K
                                                 C
                                                        50
                                                                 4
                                                                     0
## 5
                            Almond_Delight R
                                                 С
                                                        110
                                                                 2
                                                                     2
                                                                     2
## 6
                   Apple_Cinnamon_Cheerios
                                                        110
```

шш	7	A1 - T1	17	C	110	0	0
## ##		Apple_Jacks Basic_4	K G	C C	110 130	2 3	0 2
##		Bran_Chex	R	C	90	2	1
##		Bran_Flakes	r P	C	90	3	0
##		Cap'n'Crunch	Q	C	120	1	2
##		Cheerios	G G	C	110	6	2
##		Cinnamon_Toast_Crunch	G	C	120	1	3
##		Clusters	G	C	110	3	2
##		Cocoa_Puffs	G	C	110	1	1
	16	Corn_Chex	R	C	110	2	0
	17	Corn_Flakes	K	C	100	2	0
	18	Corn_Pops	K	C	110	1	0
	19	Count_Chocula	G	C	110	1	1
##		Cracklin'_Oat_Bran	K	C	110	3	3
##		Cream_of_Wheat_(Quick)	N	Н	100	3	0
##		Crispix	K	C	110	2	0
##		Crispy_Wheat_&_Raisins	G	C	100	2	1
##		Double_Chex	R	C	100	2	0
##		Froot_Loops	K	C	110	2	1
##		Frosted_Flakes	K	C	110	1	0
##		Frosted_Mini-Wheats	K	C	100	3	0
	28	Fruit_&_Fibre_Dates,_Walnuts,_and_Oats	P	C	120	3	2
##		Fruitful_Bran	K	C	120	3	0
##		Fruity_Pebbles	P	C	110	1	1
##		Golden_Crisp	P	C	100	2	0
##		Golden_Grahams	G	C	110	1	1
##		Grape_Nuts_Flakes	P	C	100	3	1
##		Grape-Nuts	P	C	110	3	0
##		Great_Grains_Pecan	Р	C	120	3	3
##		Honey_Graham_Ohs	Q	C	120	1	2
##		Honey_Nut_Cheerios	Ġ	C	110	3	1
##	38	Honey-comb	P	С	110	1	0
##	39	Just_Right_CrunchyNuggets	K	С	110	2	1
##	40	Just_Right_Fruit_&_Nut	K	С	140	3	1
##	41	Kix	G	C	110	2	1
##	42	Life	Q	C	100	4	2
##	43	Lucky_Charms	G	C	110	2	1
##	44	Maypo	Α	Н	100	4	1
##	45	Muesli_Raisins,_Dates,_&_Almonds	R	C	150	4	3
##	46	Muesli_Raisins,_Peaches,_&_Pecans	R	C	150	4	3
##	47	Mueslix_Crispy_Blend	K	C	160	3	2
##	48	Multi-Grain_Cheerios	G	C	100	2	1
##	49	Nut&Honey_Crunch	K	C	120	2	1
##	50	Nutri-Grain_Almond-Raisin	K	C	140	3	2
##	51	${ t Nutri-grain_Wheat}$	K	C	90	3	0
##	52	Oatmeal_Raisin_Crisp	G	C	130	3	2
##	53	Post_NatRaisin_Bran	P	C	120	3	1
##	54	Product_19	K	C	100	3	0
##		Puffed_Rice	Q	C	50	1	0
##		Puffed_Wheat	Q	C	50	2	0
##		Quaker_Oat_Squares	Q	C	100	4	1
##		Quaker_Oatmeal	Q	H	100	5	2
##		Raisin_Bran	K	C	120	3	1
##	60	Raisin_Nut_Bran	G	С	100	3	2

```
С
## 61
                                Raisin_Squares
                                                  K
                                                                90
                                                                         2
                                                                             0
## 62
                                     Rice_Chex
                                                  R
                                                       С
                                                               110
                                                                         1
                                                                             0
                                                                         2
## 63
                                Rice_Krispies
                                                              110
                                                                             0
                                Shredded_Wheat
                                                       С
                                                               80
                                                                         2
                                                                             0
## 64
                                                  N
## 65
                       Shredded_Wheat_'n'Bran
                                                  N
                                                       С
                                                               90
                                                                         3
                                                                             0
## 66
                    Shredded_Wheat_spoon_size
                                                       С
                                                               90
                                                                         3
                                                                             0
## 67
                                        Smacks
                                                  K
                                                       С
                                                              110
                                                                         2
                                                                             1
                                                       С
                                                                         6
                                                                             0
## 68
                                     Special_K
                                                  K
                                                              110
## 69
                      {\tt Strawberry\_Fruit\_Wheats}
                                                  N
                                                       С
                                                               90
                                                                         2
                                                                             0
                                                       С
                                                                         2
                                                                             1
## 70
                            Total_Corn_Flakes
                                                              110
## 71
                            Total_Raisin_Bran
                                                       C
                                                              140
                                                                         3
                                                                             1
                                                  G
                                                       C
                                                                         3
## 72
                            Total_Whole_Grain
                                                              100
                                                                             1
                                       Triples
                                                  G
                                                       C
                                                                         2
## 73
                                                              110
                                                                             1
                                                       C
## 74
                                                                             1
                                          Trix
                                                              110
## 75
                                    {\tt Wheat\_Chex}
                                                  R
                                                       C
                                                              100
                                                                         3
                                                                             1
                                                  G
                                                       С
## 76
                                      Wheaties
                                                              100
                                                                         3
                                                                             1
## 77
                          Wheaties_Honey_Gold
                                                       C
                                                               110
                                                                             1
```

Q8.Remove missing values in your dataset.

```
na_vec<-which(!complete.cases(Cereals))
Cereals <- Cereals[-na_vec,]
Cereals</pre>
```

##		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	${\tt Cinnamon_Toast_Crunch}$	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	С	110	2	1	125
##	26	Frosted_Flakes	K	С	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
                                                      Ρ
                                                           C
                                                                                    1
                                                                                         135
                                                                   110
                                                                               1
                                                      Ρ
                                                           C
                                                                               2
                                                                                    0
##
  31
                                                                   100
                                                                                          45
                                    Golden_Crisp
##
   32
                                  Golden Grahams
                                                      G
                                                           C
                                                                   110
                                                                               1
                                                                                    1
                                                                                         280
  33
                                                      Ρ
                                                           C
##
                               Grape_Nuts_Flakes
                                                                   100
                                                                               3
                                                                                    1
                                                                                         140
##
   34
                                       Grape-Nuts
                                                      Ρ
                                                           C
                                                                   110
                                                                               3
                                                                                    0
                                                                                         170
                                                      Ρ
                                                           C
                                                                               3
                                                                                    3
   35
                             Great Grains Pecan
                                                                   120
                                                                                          75
##
                                                      Q
                                                                                    2
##
   36
                                Honey_Graham_Ohs
                                                           C
                                                                   120
                                                                               1
                                                                                         220
                                                      G
##
  37
                             Honey_Nut_Cheerios
                                                           C
                                                                   110
                                                                               3
                                                                                    1
                                                                                         250
##
   38
                                       Honey-comb
                                                      Ρ
                                                           C
                                                                               1
                                                                                    0
                                                                                         180
                                                                   110
                                                      K
##
   39
                   Just_Right_Crunchy__Nuggets
                                                           C
                                                                   110
                                                                               2
                                                                                    1
                                                                                         170
##
   40
                         Just_Right_Fruit_&_Nut
                                                      K
                                                           С
                                                                   140
                                                                               3
                                                                                    1
                                                                                         170
                                                      G
                                                                               2
                                                           С
                                                                                    1
##
   41
                                               Kix
                                                                   110
                                                                                         260
                                                      Q
                                                                                    2
##
   42
                                             Life
                                                           C
                                                                   100
                                                                               4
                                                                                         150
                                    Lucky_Charms
                                                      G
                                                           C
                                                                               2
                                                                                    1
##
   43
                                                                   110
                                                                                         180
## 44
                                                                                    1
                                                                                            0
                                            Мауро
                                                      Α
                                                           Н
                                                                   100
                                                                               4
                                                                                    3
##
   45
             Muesli_Raisins,_Dates,_&_Almonds
                                                      R
                                                           С
                                                                   150
                                                                               4
                                                                                          95
                                                      R
                                                                               4
                                                                                    3
            Muesli_Raisins,_Peaches,_&_Pecans
                                                           C
##
   46
                                                                   150
                                                                                         150
                                                                                    2
   47
                                                      K
                                                           C
##
                           Mueslix_Crispy_Blend
                                                                   160
                                                                                         150
                                                                               2
##
   48
                                                      G
                                                           C
                                                                   100
                                                                                    1
                                                                                         220
                           Multi-Grain_Cheerios
##
   49
                                Nut&Honey_Crunch
                                                      K
                                                           C
                                                                   120
                                                                               2
                                                                                    1
                                                                                         190
##
  50
                     Nutri-Grain_Almond-Raisin
                                                      K
                                                           C
                                                                   140
                                                                               3
                                                                                    2
                                                                                         220
                                                      K
                                                           C
                                                                               3
                                                                                    0
## 51
                               Nutri-grain_Wheat
                                                                     90
                                                                                         170
                                                           \mathsf{C}
                                                                                    2
## 52
                           Oatmeal_Raisin_Crisp
                                                      G
                                                                               3
                                                                                         170
                                                                   130
                                                      Ρ
                                                           C
                                                                               3
                                                                                    1
##
  53
                          Post_Nat._Raisin_Bran
                                                                   120
                                                                                         200
                                                                                    0
##
  54
                                       Product_19
                                                      K
                                                           C
                                                                   100
                                                                               3
                                                                                         320
##
   55
                                     Puffed_Rice
                                                      Q
                                                           C
                                                                     50
                                                                               1
                                                                                    0
                                                                                            0
                                                      Q
                                                           С
                                                                               2
                                                                                    0
                                                                                            0
##
   56
                                    Puffed_Wheat
                                                                     50
                                                      Q
                                                           С
##
   57
                              Quaker_Oat_Squares
                                                                   100
                                                                               4
                                                                                    1
                                                                                         135
                                                      K
                                                                                    1
                                                           C
                                                                               3
## 59
                                      Raisin_Bran
                                                                   120
                                                                                         210
                                                                                    2
## 60
                                                      G
                                                           C
                                                                               3
                                                                                         140
                                 Raisin_Nut_Bran
                                                                   100
##
   61
                                  Raisin_Squares
                                                      K
                                                           C
                                                                     90
                                                                               2
                                                                                    0
                                                                                            0
##
   62
                                        Rice_Chex
                                                      R
                                                           C
                                                                               1
                                                                                    0
                                                                                         240
                                                                   110
                                                      K
                                                                               2
                                                                                    0
##
   63
                                   Rice_Krispies
                                                           C
                                                                   110
                                                                                         290
                                                           С
                                                                               2
                                                                                    0
##
   64
                                  Shredded_Wheat
                                                      N
                                                                     80
                                                                                            0
   65
                         Shredded_Wheat_'n'Bran
                                                      N
                                                           C
                                                                     90
                                                                               3
                                                                                    0
                                                                                            0
##
                                                           C
                                                                               3
                                                                                    0
                                                                                            0
##
   66
                     Shredded_Wheat_spoon_size
                                                      N
                                                                     90
   67
                                           Smacks
                                                      K
                                                           C
                                                                   110
                                                                                    1
                                                                                          70
                                                           C
                                                                                    0
##
  68
                                        Special_K
                                                      K
                                                                   110
                                                                               6
                                                                                         230
                                                      N
                                                           C
                                                                               2
                                                                                    0
##
   69
                        Strawberry_Fruit_Wheats
                                                                     90
                                                                                          15
  70
                                                           C
                                                                               2
                                                                                    1
                              Total_Corn_Flakes
                                                      G
##
                                                                   110
                                                                                         200
                                                      G
                                                                               3
                                                                                    1
##
   71
                               Total_Raisin_Bran
                                                           C
                                                                   140
                                                                                         190
                                                      G
                                                           C
                                                                               3
                                                                                    1
##
   72
                               Total_Whole_Grain
                                                                   100
                                                                                         200
                                                      G
                                                                               2
##
   73
                                          Triples
                                                           C
                                                                   110
                                                                                    1
                                                                                         250
                                                      G
                                                           С
                                                                                    1
  74
                                                                               1
##
                                              Trix
                                                                   110
                                                                                         140
                                                      R
                                                           C
                                                                               3
                                                                                    1
## 75
                                       Wheat_Chex
                                                                   100
                                                                                         230
                                                      G
                                                           С
                                                                                    1
## 76
                                                                   100
                                                                               3
                                         Wheaties
                                                                                         200
                                                      G
##
   77
                            Wheaties_Honey_Gold
                                                           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
                                                   3
##
   2
         2.0
                8.0
                          8
                                135
                                            0
                                                        1.00 1.00 33.98368
   3
                7.0
                          5
                                           25
                                                   3
##
        9.0
                                320
                                                        1.00 0.33 59.42551
                          0
                                                   3
##
  4
        14.0
                8.0
                                330
                                           25
                                                        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
                                            25
                                                        1.00 1.00 33.17409
```

##		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 45.00332
##	19		12.0	13		25	2	
		0.0			65 160			
##	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
##		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
##		6.0	11.0	14	260	25	3	1.33 0.67 37.84059
##		1.0	20.0	3	45	100	3	1.00 1.00 41.50354
##		0.0	13.0	0	15	0	3	0.50 1.00 60.75611
##		1.0			50	0	3	0.50 1.00 63.00565
			10.0	0				
	57	2.0	14.0	6	110	25	3	1.00 0.50 49.51187
##		5.0	14.0	12	240	25	2	1.33 0.75 39.25920
##		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	1.00	68.23588
##	65	4.0	19.0	0	140	0	1	1.00 0	0.67	74.47295
##	66	3.0	20.0	0	120	0	1	1.00 0	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	1.00	53.13132
##	69	3.0	15.0	5	90	25	2	1.00 1	1.00	59.36399
##	70	0.0	21.0	3	35	100	3	1.00 1	1.00	38.83975
##	71	4.0	15.0	14	230	100	3	1.50 1	1.00	28.59278
##	72	3.0	16.0	3	110	100	3	1.00 1	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	1.00	27.75330
##	75	3.0	17.0	3	115	25	1	1.00 0	0.67	49.78744
##	76	3.0	17.0	3	110	25	1	1.00 1	1.00	51.59219
##	77	1.0	16.0	8	60	25	1	1.00 0	.75	36.18756

You can see from the data that now we have 3 less rows in our dataset after removing N/A values.

Q9. Identify and remove duplicated data in your dataset.

```
Cereals<-Cereals[!duplicated(Cereals),]
Cereals</pre>
```

##		name	mfr	type	calories	protein	fat	sodium
##	1	100%_Bran	N	C	70	4	1	130
##	2	100%_Natural_Bran	Q	С	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
                                                      Ρ
                                                            C
                                                                                     1
                                                                                           135
                                   Fruity_Pebbles
                                                                     110
                                                                                1
                                                      Ρ
                                                            C
                                                                                2
                                                                                     0
##
   31
                                                                     100
                                                                                            45
                                     Golden_Crisp
##
   32
                                   Golden Grahams
                                                       G
                                                            C
                                                                     110
                                                                                     1
                                                                                           280
   33
                                                      Ρ
                                                            C
                                                                                     1
##
                               Grape_Nuts_Flakes
                                                                     100
                                                                                3
                                                                                           140
##
   34
                                       Grape-Nuts
                                                      Ρ
                                                            C
                                                                     110
                                                                                3
                                                                                     0
                                                                                           170
                                                      Ρ
                                                            C
                                                                                3
                                                                                     3
   35
                              Great Grains Pecan
                                                                     120
                                                                                            75
##
                                                       Q
                                                            C
                                                                                     2
##
   36
                                Honey_Graham_Ohs
                                                                     120
                                                                                1
                                                                                           220
                                                       G
##
   37
                              Honey_Nut_Cheerios
                                                            C
                                                                     110
                                                                                3
                                                                                     1
                                                                                           250
##
   38
                                       Honey-comb
                                                      Ρ
                                                            C
                                                                                1
                                                                                     0
                                                                                           180
                                                                     110
                                                       K
                                                                                     1
##
   39
                    Just_Right_Crunchy__Nuggets
                                                            С
                                                                     110
                                                                                2
                                                                                           170
##
   40
                         Just_Right_Fruit_&_Nut
                                                       K
                                                            С
                                                                     140
                                                                                3
                                                                                     1
                                                                                           170
                                                       G
                                                                                2
                                                            С
                                                                                     1
##
   41
                                               Kix
                                                                     110
                                                                                           260
                                                       Q
                                                                                     2
##
   42
                                              Life
                                                            C
                                                                     100
                                                                                4
                                                                                           150
                                                       G
                                                                                2
                                                            С
                                                                                     1
##
   43
                                     Lucky_Charms
                                                                     110
                                                                                           180
## 44
                                                                                     1
                                                                                             0
                                             Мауро
                                                       Α
                                                            Н
                                                                     100
                                                                                4
                                                                                     3
##
   45
             Muesli_Raisins,_Dates,_&_Almonds
                                                       R
                                                            С
                                                                     150
                                                                                4
                                                                                            95
                                                       R
                                                                                     3
            Muesli_Raisins,_Peaches,_&_Pecans
                                                            C
                                                                                4
##
   46
                                                                     150
                                                                                           150
                                                                                     2
                                                       K
   47
                                                            C
##
                            Mueslix_Crispy_Blend
                                                                     160
                                                                                           150
                                                                                2
##
   48
                                                       G
                                                            C
                                                                     100
                                                                                     1
                                                                                           220
                            Multi-Grain_Cheerios
##
   49
                                Nut&Honey_Crunch
                                                      K
                                                            C
                                                                     120
                                                                                2
                                                                                     1
                                                                                           190
##
   50
                      Nutri-Grain_Almond-Raisin
                                                      K
                                                            C
                                                                     140
                                                                                3
                                                                                     2
                                                                                           220
                                                       K
                                                            \mathsf{C}
                                                                                3
                                                                                     0
## 51
                               Nutri-grain_Wheat
                                                                      90
                                                                                           170
                                                                                     2
                                                            \mathsf{C}
## 52
                            Oatmeal_Raisin_Crisp
                                                       G
                                                                                3
                                                                                           170
                                                                     130
                                                      Ρ
                                                            C
                                                                                3
                                                                                     1
## 53
                          Post_Nat._Raisin_Bran
                                                                     120
                                                                                           200
                                                                                     0
## 54
                                       Product_19
                                                       K
                                                            C
                                                                     100
                                                                                3
                                                                                           320
##
   55
                                      Puffed_Rice
                                                       Q
                                                            \mathsf{C}
                                                                      50
                                                                                1
                                                                                     0
                                                                                             0
                                                       Q
                                                            С
                                                                                2
                                                                                     0
                                                                                             0
##
   56
                                     Puffed_Wheat
                                                                      50
                                                       Q
                                                            С
                                                                                     1
##
   57
                              Quaker_Oat_Squares
                                                                     100
                                                                                4
                                                                                           135
                                                       K
                                                                                     1
                                                            C
                                                                                3
## 59
                                      Raisin_Bran
                                                                     120
                                                                                           210
                                                                                     2
## 60
                                                       G
                                                            C
                                                                                3
                                                                                           140
                                 Raisin_Nut_Bran
                                                                     100
## 61
                                   Raisin_Squares
                                                      K
                                                            С
                                                                      90
                                                                                2
                                                                                     0
                                                                                             0
##
   62
                                         Rice_Chex
                                                      R
                                                            C
                                                                                1
                                                                                     0
                                                                                           240
                                                                     110
                                                       K
                                                                                2
                                                                                     0
##
   63
                                    Rice_Krispies
                                                            C
                                                                     110
                                                                                           290
                                                            С
                                                                                2
                                                                                     0
##
   64
                                   Shredded_Wheat
                                                      N
                                                                      80
                                                                                             0
   65
                         Shredded_Wheat_'n'Bran
                                                      N
                                                            C
                                                                      90
                                                                                3
                                                                                     0
                                                                                             0
##
                                                            \mathsf{C}
                                                                                3
                                                                                     0
                                                                                             0
##
   66
                      Shredded_Wheat_spoon_size
                                                      N
                                                                      90
##
   67
                                            Smacks
                                                       K
                                                            C
                                                                     110
                                                                                     1
                                                                                            70
                                                            \mathsf{C}
                                                                                     0
## 68
                                         Special_K
                                                      K
                                                                     110
                                                                                6
                                                                                           230
                                                      N
                                                            \mathsf{C}
                                                                                2
                                                                                     0
##
   69
                        Strawberry_Fruit_Wheats
                                                                      90
                                                                                            15
                                                            C
                                                                                2
                                                                                     1
   70
                               Total_Corn_Flakes
                                                       G
##
                                                                     110
                                                                                           200
                                                       G
                                                                                3
                                                                                     1
##
   71
                               Total_Raisin_Bran
                                                            C
                                                                     140
                                                                                           190
                                                       G
                                                            C
                                                                                3
                                                                                     1
##
   72
                               Total_Whole_Grain
                                                                     100
                                                                                           200
                                                      G
                                                                                2
##
   73
                                           Triples
                                                            C
                                                                     110
                                                                                     1
                                                                                           250
                                                       G
                                                            С
                                                                                     1
   74
                                                                                1
##
                                              Trix
                                                                     110
                                                                                           140
                                                       R
                                                            C
                                                                                3
                                                                                     1
## 75
                                       Wheat_Chex
                                                                     100
                                                                                           230
                                                       G
                                                            С
                                                                                     1
## 76
                                                                     100
                                                                                3
                                          Wheaties
                                                                                           200
                                                       G
##
   77
                             Wheaties_Honey_Gold
                                                            C
                                                                     110
                                                                                     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
                                                    3
##
   2
         2.0
                8.0
                          8
                                135
                                             0
                                                         1.00 1.00 33.98368
   3
                7.0
                          5
                                            25
                                                    3
##
         9.0
                                320
                                                         1.00 0.33 59.42551
                          0
                                                    3
##
   4
        14.0
                8.0
                                330
                                            25
                                                         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
                                            25
                                                         1.00 1.00 33.17409
```

## 0	2.0	18.0	0	100	25	2	1.33 0.75 37.03856
## 8 ## 9	2.0 4.0	15.0	8 6	125	25 25	3 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 41.00004
## 56	1.0	10.0	0	50	Ö	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
## 60	2.0	15.0	6	110	25 25	3	1.00 0.50 55.33314
## 61 ## 62	0.0	23.0	2	30	25 25	1	1.00 0.30 33.33314
						1	
## 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

It shows that we do not have any duplicate values in our dataset.

Q10.Reorder multiple rows in descending order.

Here, we are sorting the rows based on ratings in descending order.

```
Cereals <- arrange(Cereals,desc(Cereals$rating))
Cereals</pre>
```

##		name	mfr	type	calories	protein	fat	sodium
##	1	All-Bran_with_Extra_Fiber	K	C	50	4	0	140
##	2	Shredded_Wheat_'n'Bran	N	C	90	3	0	0
##	3	Shredded_Wheat_spoon_size	N	C	90	3	0	0
##	4	100%_Bran	N	C	70	4	1	130
##	5	Shredded_Wheat	N	C	80	2	0	0
##	6	Puffed_Wheat	Q	C	50	2	0	0
##	7	Puffed_Rice	Q	C	50	1	0	0
##	8	Nutri-grain_Wheat	K	C	90	3	0	170
##	9	All-Bran	K	C	70	4	1	260
##	10	Strawberry_Fruit_Wheats	N	C	90	2	0	15
##	11	Frosted_Mini-Wheats	K	C	100	3	0	0
##	12	Raisin_Squares	K	C	90	2	0	0
##	13	Maypo	Α	Н	100	4	1	0
##	14	Grape-Nuts	P	C	110	3	0	170
##	15	Bran_Flakes	P	C	90	3	0	210
##	16	Special_K	K	C	110	6	0	230
##	17	<pre>Grape_Nuts_Flakes</pre>	P	C	100	3	1	140
##	18	Wheaties	G	C	100	3	1	200
##	19	Cheerios	G	C	110	6	2	290
##	20	Wheat_Chex	R	C	100	3	1	230
##	21	Quaker_Oat_Squares	Q	C	100	4	1	135
##	22	Bran_Chex	R	C	90	2	1	200
##	23	Crispix	K	C	110	2	0	220
##	24	Total_Whole_Grain	G	C	100	3	1	200
	25	Corn_Flakes	K	C	100	2	0	290
##	26	<pre>Great_Grains_Pecan</pre>	P	C	120	3	3	75

```
С
                                                                                      2
## 27
                                                       Q
                                                                     100
                                                                                            150
                                               Life
                                                                                 4
                                                       R
                                                             C
                                                                                 2
                                                                                      0
## 28
                                      Double_Chex
                                                                     100
                                                                                           190
##
   29
                                        Rice Chex
                                                       R
                                                             C
                                                                     110
                                                                                      0
                                                                                            240
   30
                                                             \mathsf{C}
                                                                                      0
                                                                                            320
##
                                       Product_19
                                                       K
                                                                     100
                                                                                 3
##
   31
                                         Corn_Chex
                                                       R
                                                             \mathsf{C}
                                                                     110
                                                                                 2
                                                                                      0
                                                                                           280
##
                                                             C
                                                                                 3
                                                                                      0
   32
                                    Fruitful Bran
                                                       K
                                                                     120
                                                                                           240
                                                                                      2
                                                       Ρ
                                                             C
                                                                                 3
   33 Fruit_&_Fibre_Dates,_Walnuts,_and_Oats
                                                                     120
                                                                                           160
                                                                                      2
## 34
                      Nutri-Grain_Almond-Raisin
                                                       K
                                                             C
                                                                     140
                                                                                 3
                                                                                            220
##
   35
                                    Rice_Krispies
                                                       K
                                                             C
                                                                                 2
                                                                                      0
                                                                                           290
                                                                     110
                                                       K
                                                             С
                                                                                      3
##
   36
                              Cracklin'_Oat_Bran
                                                                     110
                                                                                 3
                                                                                            140
##
   37
                                          Clusters
                                                       G
                                                             С
                                                                     110
                                                                                 3
                                                                                      2
                                                                                            140
                                                       G
                                                                                 2
                                                             С
                                                                                      1
                                                                                            220
##
   38
                            Multi-Grain_Cheerios
                                                                     100
                                  Raisin_Nut_Bran
                                                       G
                                                                                      2
##
   39
                                                             C
                                                                     100
                                                                                 3
                                                                                           140
                                                       K
                                      Raisin_Bran
                                                             C
                                                                                 3
                                                                                      1
##
   40
                                                                     120
                                                                                            210
## 41
                                                       G
                                                             С
                                                                                 2
                                                                                      1
                                                Kix
                                                                     110
                                                                                            260
## 42
                                           Triples
                                                       G
                                                             С
                                                                     110
                                                                                 2
                                                                                      1
                                                                                            250
                                                             С
                                                                                 2
                                                                                      1
## 43
                               Total_Corn_Flakes
                                                       G
                                                                                            200
                                                                     110
                                                       P
   44
                           Post_Nat._Raisin_Bran
                                                                                 3
                                                                                      1
                                                                                            200
##
                                                                     120
                                                                                      3
##
   45
             Muesli_Raisins,_Dates,_&_Almonds
                                                       R
                                                             C
                                                                     150
                                                                                 4
                                                                                            95
                                                       G
                                                                                      2
##
   46
                                           Basic 4
                                                             C
                                                                     130
                                                                                 3
                                                                                           210
##
   47
                    Just_Right_Crunchy__Nuggets
                                                       K
                                                             C
                                                                     110
                                                                                 2
                                                                                      1
                                                                                           170
   48
                         Just_Right_Fruit_&_Nut
                                                       K
                                                             \mathsf{C}
                                                                                 3
                                                                                      1
##
                                                                     140
                                                                                            170
                                                       G
                                                             \mathsf{C}
                                                                                 2
                                                                                      1
## 49
                             Wheaties_Honey_Gold
                                                                                            200
                                                                     110
                                                       G
                                                             C
                                                                                 2
                                                                                      1
## 50
                         Crispy_Wheat_&_Raisins
                                                                     100
                                                                                           140
                                                                                      0
## 51
                                         Corn_Pops
                                                       K
                                                             C
                                                                     110
                                                                                 1
                                                                                            90
## 52
                                     Golden_Crisp
                                                       Ρ
                                                             \mathsf{C}
                                                                     100
                                                                                 2
                                                                                      0
                                                                                            45
   53
            Muesli_Raisins,_Peaches,_&_Pecans
                                                       R
                                                             С
                                                                                 4
                                                                                      3
                                                                                            150
##
                                                                     150
                                                       Q
                                                             С
                                                                                 3
                                                                                      5
##
   54
                               100%_Natural_Bran
                                                                     120
                                                                                            15
                                                                                      0
                                                       K
                                                             С
                                                                                 2
## 55
                                      Apple_Jacks
                                                                     110
                                                                                            125
## 56
                                                       K
                                                             C
                                                                                 2
                                                                                      1
                                      Froot_Loops
                                                                     110
                                                                                           125
                                                                                      0
## 57
                                   Frosted_Flakes
                                                       K
                                                             C
                                                                     110
                                                                                 1
                                                                                            200
## 58
                                                       K
                                                             C
                                                                                 2
                                                                                      1
                                                                                            70
                                            Smacks
                                                                     110
                                                             С
                                                                                 3
                                                                                      1
## 59
                              Honey_Nut_Cheerios
                                                                     110
                                                                                            250
                                                       G
                                                             С
                                                                                 3
                                                                                      2
##
   60
                            Oatmeal_Raisin_Crisp
                                                                     130
                                                                                            170
                                                                                      2
                                                             С
   61
                                                       K
                                                                     160
                                                                                 3
##
                            Mueslix_Crispy_Blend
                                                                                           150
                                                       K
                                                             \mathsf{C}
                                                                                 2
                                                                                      1
## 62
                                 Nut&Honey_Crunch
                                                                     120
                                                                                           190
                                                                                      2
   63
                        Apple_Cinnamon_Cheerios
                                                       G
                                                             C
                                                                     110
                                                                                            180
## 64
                                                       Ρ
                                                             \mathsf{C}
                                                                                      0
                                        Honey-comb
                                                                     110
                                                                                 1
                                                                                            180
                                                       G
                                                             \mathsf{C}
                                                                                 3
                                                                                      1
## 65
                               Total_Raisin_Bran
                                                                     140
                                                                                           190
                                                       Ρ
                                                             \mathsf{C}
                                                                                      1
## 66
                                   Fruity_Pebbles
                                                                                 1
                                                                                           135
                                                                     110
                                                       G
                                                             \mathsf{C}
                                                                                      1
## 67
                                               Trix
                                                                     110
                                                                                 1
                                                                                           140
                                                       G
                                                             C
                                                                                 2
                                                                                      1
## 68
                                     Lucky_Charms
                                                                     110
                                                                                           180
                                                       G
##
   69
                                   Golden_Grahams
                                                             C
                                                                     110
                                                                                 1
                                                                                      1
                                                                                           280
                                                       G
                                                             С
                                                                                      1
##
   70
                                                                                 1
                                      Cocoa_Puffs
                                                                     110
                                                                                           180
                                                       G
                                                             С
                                                                     110
                                                                                      1
## 71
                                    Count_Chocula
                                                                                 1
                                                                                           180
                                                                                      2
                                                       Q
                                                             С
## 72
                                                                     120
                                                                                            220
                                 Honey_Graham_Ohs
                                                                                 1
                                                       G
                                                                                      3
##
   73
                           Cinnamon_Toast_Crunch
                                                             C
                                                                     120
                                                                                 1
                                                                                           210
                                                       Q
                                                                     120
##
   74
                                     Cap'n'Crunch
                                                             C
                                                                                 1
                                                                                            220
##
                                                shelf
                                                      weight cups
       fiber carbo sugars
                            potass
                                     vitamins
                                                                       rating
                                                     3
##
   1
        14.0
                8.0
                           0
                                 330
                                            25
                                                         1.00 0.50 93.70491
   2
                           0
                                             0
                                                    1
##
         4.0
               19.0
                                                         1.00 0.67 74.47295
                                 140
                           0
   3
                                             0
                                                     1
##
         3.0
               20.0
                                 120
                                                         1.00 0.67 72.80179
## 4
        10.0
                5.0
                           6
                                 280
                                            25
                                                    3
                                                         1.00 0.33 68.40297
                           0
## 5
         3.0
              16.0
                                  95
                                              0
                                                         0.83 1.00 68.23588
```

ии с	1 0	10 0	0	ΕO	0	2	0 50 1 00 63 00565
## 6	1.0	10.0	0	50	0	3	0.50 1.00 63.00565
## 7	0.0	13.0	0	15	0	3	0.50 1.00 60.75611
## 8	3.0	18.0	2	90	25	3	1.00 1.00 59.64284
## 9	9.0	7.0	5	320	25	3	1.00 0.33 59.42551
## 10	3.0	15.0	5	90	25	2	1.00 1.00 59.36399
## 11	3.0	14.0	7	100	25	2	1.00 0.80 58.34514
## 12	2.0	15.0	6	110	25	3	1.00 0.50 55.33314
## 13	0.0	16.0	3	95	25	2	1.00 1.00 54.85092
## 14	3.0	17.0	3	90	25	3	1.00 0.25 53.37101
## 15	5.0	13.0	5	190	25	3	1.00 0.67 53.31381
## 16	1.0	16.0	3	55	25	1	1.00 1.00 53.13132
## 17	3.0	15.0	5	85	25	3	1.00 0.88 52.07690
## 18	3.0	17.0	3	110	25	1	1.00 1.00 51.59219
## 19	2.0	17.0	1	105	25	1	1.00 1.25 50.76500
## 20	3.0	17.0	3	115	25	1	1.00 0.67 49.78744
## 21	2.0	14.0	6	110	25	3	1.00 0.50 49.51187
## 22	4.0	15.0	6	125	25	1	1.00 0.67 49.12025
## 23	1.0	21.0	3	30	25	3	1.00 1.00 46.89564
## 24	3.0	16.0	3	110	100	3	1.00 1.00 46.65884
## 25	1.0	21.0	2	35	25	1	1.00 1.00 45.86332
## 26	3.0	13.0	4	100	25	3	1.00 0.33 45.81172
## 27	2.0	12.0	6	95	25	2	1.00 0.67 45.32807
## 28	1.0	18.0	5	80	25	3	1.00 0.75 44.33086
## 29	0.0	23.0	2	30	25	1	1.00 1.13 41.99893
## 30	1.0	20.0	3	45	100	3	1.00 1.13 41.59055
## 30	0.0	22.0	3	25	25	1	1.00 1.00 41.30334
## 31 ## 32	5.0	14.0	12	190	25 25	3	1.33 0.67 41.01549
## 32	5.0	12.0	10	200	25 25	3	1.25 0.67 40.91705
## 33 ## 34		21.0	7			3	1.33 0.67 40.69232
	3.0			130	25		
## 35	0.0	22.0	3	35	25	1	1.00 1.00 40.56016
## 36	4.0	10.0	7	160	25	3	1.00 0.50 40.44877
## 37	2.0	13.0	7	105	25	3	1.00 0.50 40.40021
## 38	2.0	15.0	6	90	25	1	1.00 1.00 40.10596
## 39	2.5	10.5	8	140	25	3	1.00 0.50 39.70340
## 40	5.0	14.0	12	240	25	2	1.33 0.75 39.25920
## 41	0.0	21.0	3	40	25	2	1.00 1.50 39.24111
## 42	0.0	21.0	3	60	25	3	1.00 0.75 39.10617
## 43	0.0	21.0	3	35	100	3	1.00 1.00 38.83975
## 44	6.0	11.0	14	260	25	3	1.33 0.67 37.84059
## 45	3.0	16.0	11	170	25	3	1.00 1.00 37.13686
## 46	2.0	18.0	8	100	25	3	1.33 0.75 37.03856
## 47	1.0	17.0	6	60	100	3	1.00 1.00 36.52368
## 48	2.0	20.0	9	95	100	3	1.30 0.75 36.47151
## 49	1.0	16.0	8	60	25	1	1.00 0.75 36.18756
## 50	2.0	11.0	10	120	25	3	1.00 0.75 36.17620
## 51	1.0	13.0	12	20	25	2	1.00 1.00 35.78279
## 52	0.0	11.0	15	40	25	1	1.00 0.88 35.25244
## 53	3.0	16.0	11	170	25	3	1.00 1.00 34.13976
## 54	2.0	8.0	8	135	0	3	1.00 1.00 33.98368
## 55	1.0	11.0	14	30	25	2	1.00 1.00 33.17409
## 56	1.0	11.0	13	30	25	2	1.00 1.00 32.20758
## 57	1.0	14.0	11	25	25	1	1.00 0.75 31.43597
## 58	1.0	9.0	15	40	25	2	1.00 0.75 31.23005
## 59	1.5	11.5	10	90	25	1	1.00 0.75 31.07222

```
## 60
        1.5 13.5
                      10
                            120
                                       25
                                                  1.25 0.50 30.45084
## 61
        3.0 17.0
                      13
                            160
                                       25
                                              3
                                                  1.50 0.67 30.31335
                                       25
                                                  1.00 0.67 29.92429
## 62
        0.0 15.0
                       9
                             40
                             70
                                       25
## 63
        1.5 10.5
                      10
                                                  1.00 0.75 29.50954
## 64
        0.0
            14.0
                      11
                             35
                                       25
                                              1
                                                  1.00 1.33 28.74241
## 65
                      14
                                      100
                                              3
                                                  1.50 1.00 28.59278
        4.0 15.0
                            230
## 66
        0.0 13.0
                      12
                                       25
                                                  1.00 0.75 28.02576
                             25
                                              2
## 67
        0.0 13.0
                      12
                             25
                                       25
                                                  1.00 1.00 27.75330
## 68
        0.0 12.0
                      12
                             55
                                       25
                                              2
                                                  1.00 1.00 26.73451
                                       25
                                              2
## 69
        0.0 15.0
                       9
                             45
                                                  1.00 0.75 23.80404
##
  70
        0.0 12.0
                      13
                             55
                                       25
                                              2
                                                  1.00 1.00 22.73645
                                       25
                                              2
  71
        0.0 12.0
                      13
                             65
                                                  1.00 1.00 22.39651
##
                                       25
                                              2
##
  72
        1.0 12.0
                      11
                             45
                                                  1.00 1.00 21.87129
                       9
                                       25
                                              2
## 73
        0.0 13.0
                              45
                                                  1.00 0.75 19.82357
## 74
        0.0 12.0
                      12
                              35
                                       25
                                              2
                                                  1.00 0.75 18.04285
```

Q11. Rename some of the column names in your dataset.

Here, We have renamed the two variables, 1: name to Cereals Names, and 2: carbo to carbohydrates.

```
names(Cereals) [names(Cereals) == "name"] <- "Cereals Names"
names(Cereals) [names(Cereals) == "carbo"] <- "carbohydrates"
Cereals</pre>
```

##		Cereals Names	${\tt mfr}$	type	${\tt calories}$	protein	fat	sodium
##	1	All-Bran_with_Extra_Fiber	K	C	50	4	0	140
##	2	Shredded_Wheat_'n'Bran	N	C	90	3	0	0
##	3	Shredded_Wheat_spoon_size	N	C	90	3	0	0
##	4	100%_Bran	N	C	70	4	1	130
##	5	Shredded_Wheat	N	C	80	2	0	0
##	6	Puffed_Wheat	Q	C	50	2	0	0
##	7	Puffed_Rice	Q	C	50	1	0	0
##	8	Nutri-grain_Wheat	K	C	90	3	0	170
##	9	All-Bran	K	C	70	4	1	260
##	10	Strawberry_Fruit_Wheats	N	C	90	2	0	15
##	11	Frosted_Mini-Wheats	K	C	100	3	0	0
##	12	Raisin_Squares	K	C	90	2	0	0
##	13	Maypo	Α	Н	100	4	1	0
##	14	Grape-Nuts	P	C	110	3	0	170
##	15	Bran_Flakes	P	C	90	3	0	210
##	16	Special_K	K	C	110	6	0	230
##	17	<pre>Grape_Nuts_Flakes</pre>	P	C	100	3	1	140
##	18	Wheaties	G	C	100	3	1	200
##	19	Cheerios	G	C	110	6	2	290
##	20	Wheat_Chex	R	С	100	3	1	230
##	21	Quaker_Oat_Squares	Q	С	100	4	1	135
##	22	Bran_Chex	R	С	90	2	1	200
##	23	Crispix	K	C	110	2	0	220
##	24	Total_Whole_Grain	G	C	100	3	1	200
##	25	Corn_Flakes	K	C	100	2	0	290

##	26	Great_Grains_Pecan	Р	С	120	3	3	75
##	27	Life	Q	C	100	4	2	150
##	28	Double_Chex	R	C	100	2	0	190
##	29	Rice_Chex	R	C	110	1	0	240
##	30	Product_19	K	C	100	3	0	320
##	31	Corn_Chex	R	C	110	2	0	280
##	32	Fruitful_Bran	K	C	120	3	0	240
##		<pre>Fruit_&_Fibre_Dates,_Walnuts,_and_Oats</pre>	Р	С	120	3	2	160
##	34	Nutri-Grain_Almond-Raisin	K	С	140	3	2	220
	35	Rice_Krispies	K	С	110	2	0	290
##	36	Cracklin'_Oat_Bran	K	C	110	3	3	140
##	37	Clusters	G	C	110	3	2	140
##	38	Multi-Grain_Cheerios	G	C	100	2	1	220
##	39	Raisin_Nut_Bran	G	C	100	3	2	140
	40	Raisin_Bran	K	C	120	3	1	210
##	41	Kix	G	C	110	2	1	260
	42	Triples	G	C	110	2	1	250
##	43	Total_Corn_Flakes Post_NatRaisin_Bran	G	C	110	2 3	1 1	200
	45	Post_Natraisin_brain Muesli_Raisins,_Dates,_&_Almonds	P R	C C	120 150	3 4	3	200 95
	46	Basic_4	G	C	130	3	2	210
	47	Just_Right_CrunchyNuggets	K	C	110	2	1	170
	48	Just_Right_Fruit_&_Nut	K	C	140	3	1	170
	49	Wheaties_Honey_Gold	G	C	110	2	1	200
	50	Crispy_Wheat_&_Raisins	G	C	100	2	1	140
	51	Corn_Pops	K	C	110	1	0	90
##	52	Golden_Crisp	P	C	100	2	0	45
##	53	Muesli_Raisins,_Peaches,_&_Pecans	R	C	150	4	3	150
##	54	100%_Natural_Bran	Q	С	120	3	5	15
##	55	Apple_Jacks	K	С	110	2	0	125
##	56	Froot_Loops	K	C	110	2	1	125
##	57	Frosted_Flakes	K	C	110	1	0	200
##	58	Smacks	K	C	110	2	1	70
##	59	${\tt Honey_Nut_Cheerios}$	G	C	110	3	1	250
##	60	${\tt Oatmeal_Raisin_Crisp}$	G	C	130	3	2	170
	61	Mueslix_Crispy_Blend	K	C	160	3	2	150
##	62	Nut&Honey_Crunch	K	С	120	2	1	190
##		Apple_Cinnamon_Cheerios	G	С	110	2	2	180
##		Honey-comb	P	C	110	1	0	180
	65	Total_Raisin_Bran	G	C	140	3	1	190
	66	Fruity_Pebbles	P	C	110	1	1	135
	67	Trix		C	110	1	1	140
	68 69	Lucky_Charms	G G	C C	110	2 1	1	180
	70	Golden_Grahams Cocoa_Puffs	G	C	110 110	1	1 1	280 180
	71	Count_Chocula		C	110	1	1	180
	72	Honey_Graham_Ohs	Q	C	120	1	2	220
##		Cinnamon_Toast_Crunch	G	C	120	1	3	210
##		Cap'n'Crunch		C	120	1	2	220
##	, -	fiber carbohydrates sugars potass vita					ting	220
##	1	14.0 8.0 0 330	25	3	1.00 0.50		_	
	2	4.0 19.0 0 140	0	1	1.00 0.67			
	3	3.0 20.0 0 120	0	1	1.00 0.67			
##		10.0 5.0 6 280	25	3	1.00 0.33			

## 6 1.0 10.0 0 50 0 3 0.50 1.00 63.00666 ## 7 0 0.0 13.0 0 15 0 3 0.50 1.00 60.75611 ## 8 3.0 18.0 2 90 25 3 1.00 1.00 60.75611 ## 10 3.0 15.0 5 90 25 3 1.00 1.00 59.64284 ## 9 9 9.0 7.0 5 320 25 3 1.00 1.00 59.64284 ## 11 3.0 14.0 7 100 25 2 1.00 1.00 59.36399 ## 11 3.0 14.0 7 100 25 2 1.00 1.00 59.36399 ## 11 3.0 16.0 3 95 25 2 1.00 1.00 54.85099 ## 11 3.0 16.0 3 95 25 2 1.00 1.00 54.85099 ## 11 3.0 16.0 3 95 25 2 1.00 1.00 54.85099 ## 11 3.0 16.0 3 95 25 2 1.00 1.00 54.85099 ## 11 3.0 16.0 3 95 25 2 1.00 1.00 54.85099 ## 11 3.0 16.0 3 95 25 2 1.00 1.00 54.85099 ## 11 3.0 16.0 3 95 25 2 1.00 1.00 54.85099 ## 11 3.0 16.0 3 95 25 2 1.00 1.00 54.85099 ## 11 3.0 16.0 3 95 25 2 1.00 1.00 54.85099 ## 11 3.0 16.0 3 95 25 3 1.00 0.67 53.31881 ## 17 3.0 16.0 3 55 25 1 1.00 1.00 54.85099 ## 18 18 3.0 17.0 3 110 25 3 1.00 0.67 53.31881 ## 17 3.0 15.0 5 85 25 3 1.00 0.67 53.31881 ## 17 3.0 15.0 5 85 25 3 1.00 0.67 53.31881 ## 18 3.0 17.0 3 110 25 1 1.00 1.05 51.59219 ## 19 2.0 17.0 1 105 25 1 1.00 1.00 51.59219 ## 19 2.0 17.0 1 105 25 1 1.00 1.00 67.89.78744 ## 21 2.0 14.0 6 110 25 3 1.00 0.67 49.78744 ## 22 4.0 15.0 6 125 25 1 1.00 0.67 49.12025 ## 23 1.0 21.0 3 30 25 3 1.00 0.68 49.5187 ## 24 3.0 16.0 3 110 100 3 1.00 1.00 46.65884 ## 25 1.0 21.0 21.0 3 30 25 3 1.00 0.67 49.8332 ## 28 1.0 21.0 21.0 2 35 25 1 1.00 1.00 46.65884 ## 25 1.0 21.0 21.0 2 35 25 1 1.00 1.00 46.65884 ## 25 1.0 21.0 21.0 2 35 25 1 1.00 1.00 46.65884 ## 25 1.0 21.0 21.0 2 35 25 1 1.00 1.00 46.65884 ## 25 1.0 21.0 21.0 2 35 25 1 1.00 1.00 46.65884 ## 25 1.0 21.0 21.0 2 35 25 1 1.00 1.00 46.65884 ## 25 1.0 21.0 21.0 2 35 25 2 1.00 0.67 45.32807 ## 33 1.00 2.50 40.021 ## 33 1.00 2.50 40.021 ## 33 1.00 2.50 40.021 ## 34 1.00 2.0 2 3 3 25 25 1 1.00 1.00 46.65884 ## 25 1.0 2.0 10 20 2 3 3 25 2 1 1.00 1.00 46.65884 ## 25 1.0 2.0 10 20 2 3 3 25 2 1 1.00 1.00 34.8399 ## 34 3.0 2.0 15.0 16.0 17 160 25 3 1.33 0.67 40.99222 ## 35 1.00 1.00 34.8397 ## 37 2.0 13.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1	## 5	3.0	16.0	0	95	0	1	0.83 1.00 68.23588
## 7								
## 8								
## 9 9.0 7.0 5 320 25 3 1.00 0.33 59.42551 ## 10 3.0 15.0 5 90 25 2 1.00 1.00 59.36399 ## 11 3.0 14.0 7 100 25 2 1.00 0.80 58.36314 ## 11 3.0 16.0 16.0 3 95 25 2 1.00 0.80 58.34514 ## 11 3.0 16.0 16.0 3 95 25 2 1.00 0.50 55.33314 ## 13 0.0 16.0 3 95 25 2 1.00 0.50 55.33314 ## 15 5.0 13.0 16.0 3 95 25 3 1.00 0.25 53.37101 ## 15 5.0 13.0 16.0 3 55 25 1 1.00 0.67 53.31381 ## 16 1.0 16.0 3 55 25 1 1.00 1.00 54.85092 ## 17 3.0 15.0 5 85 25 3 1.00 0.67 53.31381 ## 17 3.0 15.0 5 85 25 3 1.00 0.67 53.31381 ## 17 3.0 15.0 5 85 25 3 1.00 0.88 52.07690 ## 18 3 3.0 17.0 3 110 25 1 1.00 1.00 51.59219 ## 19 2.0 17.0 1 105 25 1 1.00 1.00 51.59219 ## 19 2.0 17.0 1 105 25 1 1.00 1.00 6.67 49.78744 ## 21 2.0 14.0 6 110 25 3 1.00 0.67 49.78744 ## 21 2.0 14.0 6 110 25 3 1.00 0.67 49.78744 ## 22 4.0 15.0 6 125 25 1 1.00 0.67 49.58864 ## 24 3.0 16.0 3 110 100 3 1.00 0.67 49.58864 ## 24 3.0 16.0 3 110 100 3 1.00 0.67 49.58864 ## 25 1.0 21.0 21.0 3 30 25 3 1.00 0.50 49.5187 ## 25 1.0 21.0 21.0 3 30 25 3 1.00 0.07 44.89564 ## 26 3.0 13.0 13.0 4 100 25 3 1.00 1.00 46.65884 ## 27 2.0 12.0 6 95 25 2 1.00 0.67 49.5886 ## 28 1.0 21.0 23.0 23.0 25 3 1.00 0.33 45.81172 ## 27 2.0 12.0 6 95 25 25 1 1.00 0.67 49.5886 ## 28 1.0 18.0 5 80 25 3 1.00 0.75 44.3986 ## 33 1.0 0.2 2.0 3 45 100 3 1.00 1.00 44.65884 ## 31 0.0 2.0 3 45.81172 ## 27 2.0 12.0 6 95 25 2 1.00 0.67 44.59886 ## 33 1.0 0.2 2.0 3 45 100 3 1.00 1.00 44.665884 ## 33 1.0 0 22.0 3 45 10 1.00 1.13 41.99893 ## 33 1.0 0 22.0 3 45 10 1.00 1.00 41.60588 ## 33 1.0 0 22.0 3 45 10 1.00 1.00 41.6058 ## 34 1.00 1.00 22.0 3 25 25 1 1.00 1.00 41.6058 ## 34 1.00 1.00 40.60616 ## 34 1.00 1.00 41.6058 ## 35 0.0 12.0 10 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0								
## 10		9.0				25		1.00 0.33 59.42551
## 11 3.0 14.0 7 100 25 2 1.00 0.80 58.34514 ## 12 2.0 15.0 6 110 25 3 1.00 0.50 55.33314 ## 13 0.0 16.0 3 95 25 22 1.00 1.00 5.55.33314 ## 15 5.0 13.0 5 190 25 3 1.00 0.25 53.37101 ## 15 5.0 13.0 5 190 25 3 1.00 0.67 53.31381 ## 17 3.0 15.0 5 85 25 11 1.00 1.00 53.31381 ## 18 3.0 17.0 3 150 25 3 1.00 0.67 53.31381 ## 18 3.0 17.0 3 150 25 1 1.00 1.00 53.31381 ## 18 3.0 17.0 3 110 25 1 1.00 1.00 55.59219 ## 18 3.0 17.0 3 115 25 1 1.00 1.00 55.59219 ## 20 3.0 17.0 3 115 25 1 1.00 0.67 49.78744 ## 21 2.0 14.0 6 110 25 3 1.00 0.67 49.78744 ## 22 3.0 14.0 6 125 25 1 1.00 0.67 49.78744 ## 24 3.0 16.0 3 150 6 125 25 1 1.00 0.67 49.51875 ## 28 1.0 21.0 3 30 25 3 1.00 1.00 46.85844 ## 24 3.0 16.0 3 110 100 3 1.00 1.00 46.85844 ## 25 1.0 21.0 2 35 25 1 1.00 0.07 49.18745 ## 28 1.0 21.0 3 30 25 3 1.00 1.00 46.85844 ## 29 0.0 12.0 6 95 25 2 1.00 0.0 3 45.8187 ## 28 1.0 18.0 5 80 25 3 1.00 0.07 49.1874 ## 28 1.0 18.0 5 80 25 3 1.00 0.07 49.18983 ## 30 1.0 20.0 3 45 100 25 3 1.00 0.07 49.18983 ## 31 0.0 22.0 3 25 3 1.00 0.75 44.33086 ## 33 5.0 12.0 10 20 25 3 1.00 0.07 44.49602 ## 33 5.0 12.0 10 20 25 3 1.00 0.07 44.05983 ## 34 30 1.0 20.0 3 45 100 25 3 1.00 0.07 44.059983 ## 35 0.0 22.0 3 25 25 1 1.00 1.00 40.65844 ## 37 2.0 12.0 6 95 25 25 1 1.00 1.00 40.65064 ## 37 2.0 12.0 6 95 25 25 1 1.00 0.07 54.33086 ## 39 2.0 15.0 6 0.0 22.0 3 25 25 1 1.00 0.07 54.33086 ## 39 2.0 15.0 6 0.0 22.0 3 25 25 1 1.00 0.0 67 45.9292 ## 34 3.0 21.0 7 130 25 3 1.33 0.67 40.69232 ## 35 5.0 14.0 12 240 25 2 1.00 1.00 40.50016 ## 37 2.0 13.0 7 105 25 3 1.00 0.50 40.40021 ## 38 2.0 15.0 6 0 0 22.0 3 35 25 1 1.00 1.00 40.50016 ## 37 2.0 13.0 7 105 25 3 1.00 0.50 40.40021 ## 38 2.0 15.0 6 0 0 22 2 0 3 35 25 1 1.00 1.00 33.83875 ## 44 5.0 16.0 11.0 17.0 6 6 6 60 100 3 1.00 1.00 37.8465 ## 47 1.0 17.0 6 6 60 25 3 1.00 0.75 36.1756 ## 48 2.0 20 11.0 17.0 6 60 125 3 1.00 0.75 36.1756 ## 55 2.0 0 11.0 17.0 15 40 25 1 1.00 1.00 37.8465 ## 57 1.0 11.0 11.0 13 30 25 2 1.00 1.00 33.17409 ## 55 1.0 11.0 11.0 13 30 25 2 1.00 1.00 33.17409						25		
## 12	## 11	3.0			100	25	2	1.00 0.80 58.34514
## 14	## 12			6	110	25	3	1.00 0.50 55.33314
## 15 5.0	## 13	0.0	16.0	3	95	25	2	1.00 1.00 54.85092
## 16	## 14	3.0	17.0	3	90	25	3	1.00 0.25 53.37101
## 17 3.0	## 15	5.0	13.0	5	190	25	3	1.00 0.67 53.31381
## 18	## 16	1.0	16.0	3	55	25	1	1.00 1.00 53.13132
## 19	## 17	3.0	15.0	5	85	25	3	1.00 0.88 52.07690
## 20	## 18	3.0	17.0	3	110	25	1	1.00 1.00 51.59219
## 21	## 19	2.0	17.0	1	105	25	1	1.00 1.25 50.76500
## 22	## 20	3.0	17.0	3	115	25	1	1.00 0.67 49.78744
## 23	## 21	2.0	14.0	6	110	25	3	1.00 0.50 49.51187
## 24	## 22	4.0	15.0	6	125	25	1	1.00 0.67 49.12025
## 25	## 23	1.0	21.0	3	30	25	3	1.00 1.00 46.89564
## 26	## 24	3.0	16.0	3	110	100	3	1.00 1.00 46.65884
## 27	## 25	1.0	21.0	2	35	25	1	1.00 1.00 45.86332
## 28	## 26	3.0	13.0	4	100	25	3	1.00 0.33 45.81172
## 28	## 27			6			2	1.00 0.67 45.32807
## 29 0.0 23.0 2 30 25 1 1.00 1.13 41.99893 ## 30 1.0 20.0 3 45 100 3 1.00 1.00 41.50354 ## 31 0.0 22.0 3 25 25 1 1.00 1.00 41.44502 ## 32 5.0 14.0 12 190 25 3 1.33 0.67 41.01549 ## 33 5.0 12.0 10 200 25 3 1.33 0.67 40.91705 ## 36 0.0 22.0 3 35 25 1 1.00 1.00 40.56016 ## 37 2.0 13.0 7 160 25 3 1.00 0.50 40.44877 ## 38 2.0 15.0 6 90 25 1 1.00 1.00 40.10596 ## 39 2.5 10.5 8 140 25 3 1.00 0.50 40.40021 ## 40 5.0 14.0 12 240 25 2 1.03 0.75 39.25920 ## 41 0.0 21.0 3 40 25 2 1.00 1.50 39.24111 ## 42 0.0 21.0 3 40 25 3 1.30 0.75 39.25920 ## 44 6.0 11.0 14 260 25 3 1.00 0.75 39.10617 ## 48 2.0 16.0 11 170 25 3 1.00 1.00 38.83975 ## 44 6.0 11.0 17.0 6 60 10 3 1.00 1.00 37.13686 ## 48 2.0 16.0 11 170 25 3 1.00 0.75 39.03858 ## 49 1.0 16.0 8 60 25 1 1.00 1.00 35.78279 ## 49 1.0 16.0 8 60 25 1 1.00 0.75 36.17620 ## 49 1.0 13.0 12 20 25 2 1.00 1.00 35.78279 ## 49 1.0 16.0 8 60 25 1 1.00 0.75 36.17620 ## 51 1.0 13.0 12 20 25 2 1.00 1.00 33.98368 ## 55 1.0 11.0 14 30 25 2 1.00 1.00 33.98368 ## 55 1.0 11.0 14 30 25 2 1.00 1.00 33.98368 ## 55 1.0 11.0 14 30 25 2 1.00 1.00 33.98368 ## 56 1.0 11.0 14 30 25 2 1.00 1.00 33.98368 ## 55 1.0 11.0 14 30 25 2 1.00 1.00 33.17409 ## 56 1.0 11.0 14 30 25 2 1.00 1.00 33.17409	## 28	1.0	18.0	5	80		3	1.00 0.75 44.33086
## 30	## 29	0.0		2	30		1	1.00 1.13 41.99893
## 31 0.0 22.0 3 25 25 1 1.00 1.00 41.44502 ## 32 5.0 14.0 12 190 25 3 1.33 0.67 41.01549 ## 33 5.0 12.0 10 200 25 3 1.25 0.67 40.91705 ## 34 3.0 21.0 7 130 25 3 1.33 0.67 40.69232 ## 35 0.0 22.0 3 35 25 1 1.00 1.00 40.56016 ## 36 4.0 10.0 7 160 25 3 1.00 0.50 40.44877 ## 37 2.0 13.0 7 105 25 3 1.00 0.50 40.40021 ## 38 2.0 15.0 6 90 25 1 1.00 1.00 40.10596 ## 39 2.5 10.5 8 140 25 3 1.00 0.50 39.70340 ## 40 5.0 14.0 12 240 25 2 1.33 0.75 39.25920 ## 41 0.0 21.0 3 40 25 2 1.00 1.50 39.24111 ## 42 0.0 21.0 3 40 25 2 1.00 1.50 39.24111 ## 44 6.0 11.0 14 260 25 3 1.00 0.75 39.10617 ## 45 3.0 16.0 11 170 25 3 1.00 1.00 37.13686 ## 46 2.0 18.0 8 100 25 3 1.33 0.75 37.03856 ## 47 1.0 17.0 6 60 100 3 1.00 1.00 36.52368 ## 48 2.0 20.0 9 95 100 3 1.30 0.75 36.47151 ## 49 1.0 16.0 8 60 25 1 1.00 0.75 36.47151 ## 49 1.0 13.0 12 20 25 2 1.00 1.00 38.578279 ## 55 1.0 11.0 14 30 25 2 1.00 1.00 38.3578279 ## 55 1.0 11.0 14 30 25 2 1.00 1.00 33.17409 ## 55 1.0 11.0 14 30 25 2 1.00 1.00 33.17409 ## 56 1.0 11.0 14 30 25 2 1.00 1.00 33.17409 ## 56 1.0 11.0 14 30 25 2 1.00 1.00 33.17409		1.0					3	
## 32 5.0 14.0 12 190 25 3 1.33 0.67 41.01549 ## 33 5.0 12.0 10 200 25 3 1.25 0.67 40.91705 ## 34 3.0 21.0 7 130 25 3 1.33 0.67 40.69232 ## 35 0.0 22.0 3 35 25 1 1.00 1.00 40.56016 ## 37 2.0 13.0 7 160 25 3 1.00 0.50 40.4021 ## 38 2.0 15.0 6 90 25 1 1.00 1.00 40.10596 ## 39 2.5 10.5 8 140 25 3 1.00 0.50 40.4021 ## 40 5.0 14.0 12 240 25 2 1.33 0.75 39.25920 ## 41 0.0 21.0 3 40 25 2 1.00 1.50 39.24111 ## 42 0.0 21.0 3 60 25 3 1.00 0.75 39.10617 ## 43 0.0 21.0 3 35 100 3 1.00 0.75 39.10617 ## 44 6.0 11.0 14 260 25 3 1.30 0.75 39.24111 ## 45 3.0 16.0 11 170 25 3 1.00 1.00 38.83975 ## 46 2.0 18.0 8 100 25 3 1.33 0.75 37.03856 ## 47 1.0 17.0 6 60 100 3 1.30 0.75 36.17526 ## 48 2.0 20.0 9 95 100 3 1.00 1.00 36.52368 ## 48 2.0 20.0 9 95 100 3 1.00 0.75 36.17526 ## 50 2.0 11.0 10 120 25 3 1.00 0.75 36.17526 ## 51 1.0 13.0 12 20 25 2 1.00 1.00 35.78279 ## 52 0.0 11.0 15 40 25 1 1.00 0.75 36.17620 ## 53 3.0 16.0 11 170 25 3 1.00 0.75 36.17620 ## 53 3.0 16.0 11 170 25 3 1.00 0.75 36.17620 ## 51 1.0 13.0 12 20 25 2 1.00 1.00 35.78279 ## 55 1.0 11.0 14 30 25 2 1.00 1.00 33.98368 ## 55 1.0 11.0 14 30 25 2 1.00 1.00 33.98368 ## 55 1.0 11.0 14 30 25 2 1.00 1.00 33.98368 ## 56 1.0 11.0 14 30 25 2 1.00 1.00 33.98368		0.0					1	
## 33 5.0 12.0 10 200 25 3 1.25 0.67 40.91705 ## 34 3.0 21.0 7 130 25 3 1.33 0.67 40.69232 ## 35 0.0 22.0 3 35 25 1 1.00 1.00 40.56016 ## 36 4.0 10.0 7 160 25 3 1.00 0.50 40.44877 ## 37 2.0 13.0 7 105 25 3 1.00 0.50 40.40021 ## 38 2.0 15.0 6 90 25 1 1.00 1.00 40.10596 ## 39 2.5 10.5 8 140 25 3 1.00 0.50 39.70340 ## 40 5.0 14.0 12 240 25 2 1.33 0.75 39.25920 ## 41 0.0 21.0 3 40 25 2 1.00 1.50 39.24111 ## 42 0.0 21.0 3 60 25 3 1.00 0.75 39.10617 ## 43 0.0 21.0 3 35 100 3 1.00 0.75 39.10617 ## 44 6.0 11.0 14 260 25 3 1.00 1.00 38.83975 ## 44 6.0 11.0 14 260 25 3 1.00 1.00 37.13686 ## 46 2.0 18.0 8 100 25 3 1.33 0.75 37.03856 ## 47 1.0 17.0 6 60 100 3 1.30 0.75 36.47151 ## 49 1.0 16.0 8 60 25 1 1.00 0.75 36.18756 ## 49 1.0 16.0 11 170 25 3 1.00 0.75 36.18756 ## 50 2.0 11.0 13.0 12 20 25 2 1.00 1.00 35.78279 ## 51 1.0 13.0 12 20 25 2 1.00 1.00 33.19368 ## 55 1.0 11.0 14 30 25 2 1.00 1.00 33.98368 ## 55 1.0 11.0 14 30 25 2 1.00 1.00 33.98368 ## 55 1.0 11.0 14 30 25 2 1.00 1.00 33.98368 ## 55 1.0 11.0 14 30 25 2 1.00 1.00 33.98368 ## 55 1.0 11.0 14 30 25 2 1.00 1.00 33.98368 ## 55 1.0 11.0 14 30 25 2 1.00 1.00 33.17409 ## 56 1.0 11.0 13 30 25 2 1.00 1.00 33.17409	## 32						3	1.33 0.67 41.01549
## 35 0.0	## 33	5.0					3	1.25 0.67 40.91705
## 36	## 34	3.0	21.0	7	130	25	3	1.33 0.67 40.69232
## 37	## 35	0.0	22.0	3	35	25	1	1.00 1.00 40.56016
## 38 2.0	## 36	4.0	10.0	7	160	25	3	1.00 0.50 40.44877
## 39	## 37	2.0	13.0	7	105	25	3	1.00 0.50 40.40021
## 40 5.0	## 38	2.0	15.0	6	90	25	1	1.00 1.00 40.10596
## 41 0.0 21.0 3 40 25 2 1.00 1.50 39.24111 ## 42 0.0 21.0 3 60 25 3 1.00 0.75 39.10617 ## 43 0.0 21.0 3 35 100 3 1.00 1.00 38.83975 ## 44 6.0 11.0 14 260 25 3 1.33 0.67 37.84059 ## 45 3.0 16.0 11 170 25 3 1.00 1.00 37.13686 ## 46 2.0 18.0 8 100 25 3 1.33 0.75 37.03856 ## 47 1.0 17.0 6 60 100 3 1.00 1.00 36.52368 ## 48 2.0 20.0 9 95 100 3 1.30 0.75 36.47151 ## 49 1.0 16.0 8 60 25 1 1.00 0.75 36.18756 ## 50 2.0 11.0 10 120 25 3 1.00 0.75 36.17620 ## 51 1.0 13.0 12 20 25 2 1.00 1.00 35.78279 ## 52 0.0 11.0 15 40 25 1 1.00 0.88 35.25244 ## 53 3.0 16.0 11 170 25 3 1.00 1.00 34.13976 ## 54 2.0 8.0 8 135 0 3 1.00 1.00 33.98368 ## 55 1.0 11.0 14 30 25 2 1.00 1.00 33.17409 ## 56 1.0 11.0 13 30 25 2 1.00 1.00 32.20758 ## 57 1.0 14.0 11 25 25 1 1.00 0.75 31.43597	## 39	2.5	10.5	8	140	25	3	1.00 0.50 39.70340
## 42 0.0 21.0 3 60 25 3 1.00 0.75 39.10617 ## 43 0.0 21.0 3 35 100 3 1.00 1.00 38.83975 ## 44 6.0 11.0 14 260 25 3 1.33 0.67 37.84059 ## 45 3.0 16.0 11 170 25 3 1.00 1.00 37.13686 ## 46 2.0 18.0 8 100 25 3 1.33 0.75 37.03856 ## 47 1.0 17.0 6 60 100 3 1.00 1.00 36.52368 ## 48 2.0 20.0 9 95 100 3 1.30 0.75 36.47151 ## 49 1.0 16.0 8 60 25 1 1.00 0.75 36.18756 ## 50 2.0 11.0 10 120 25 3 1.00 0.75 36.17620 ## 51 1.0 13.0 12 20 25 2 1.00 1.00 35.78279 ## 52 0.0 11.0 15 40 25 1 1.00 0.88 35.25244 ## 53 3.0 16.0 11 170 25 3 1.00 1.00 34.13976 ## 54 2.0 8.0 8 135 0 3 1.00 1.00 33.17409 ## 55 1.0 11.0 13 30 25 2 1.00 1.00 33.17409 ## 56 1.0 11.0 13 30 25 2 1.00 1.00 32.20758 ## 57 1.0 14.0 11 25 25 1 1.00 0.75 31.43597	## 40	5.0	14.0	12	240	25	2	1.33 0.75 39.25920
## 43 0.0 21.0 3 35 100 3 1.00 1.00 38.83975 ## 44 6.0 11.0 14 260 25 3 1.33 0.67 37.84059 ## 45 3.0 16.0 11 170 25 3 1.00 1.00 37.13686 ## 46 2.0 18.0 8 100 25 3 1.33 0.75 37.03856 ## 47 1.0 17.0 6 60 100 3 1.00 1.00 36.52368 ## 48 2.0 20.0 9 95 100 3 1.30 0.75 36.47151 ## 49 1.0 16.0 8 60 25 1 1.00 0.75 36.18756 ## 50 2.0 11.0 10 120 25 3 1.00 0.75 36.17620 ## 51 1.0 13.0 12 20 25 2 1.00 1.00 35.78279 ## 52 0.0 11.0 15 40 25 1 1.00 0.88 35.25244 ## 53 3.0 16.0 11 170 25 3 1.00 1.00 34.13976 ## 54 2.0 8.0 8 135 0 3 1.00 1.00 33.98368 ## 55 1.0 11.0 14 30 25 2 1.00 1.00 33.17409 ## 56 1.0 11.0 13 30 25 2 1.00 1.00 32.20758 ## 57 1.0 14.0 11 25 25 1 1.00 0.75 31.43597	## 41	0.0	21.0	3	40	25	2	1.00 1.50 39.24111
## 43 0.0 21.0 3 35 100 3 1.00 1.00 38.83975 ## 44 6.0 11.0 14 260 25 3 1.33 0.67 37.84059 ## 45 3.0 16.0 11 170 25 3 1.00 1.00 37.13686 ## 46 2.0 18.0 8 100 25 3 1.33 0.75 37.03856 ## 47 1.0 17.0 6 60 100 3 1.00 1.00 36.52368 ## 48 2.0 20.0 9 95 100 3 1.30 0.75 36.47151 ## 49 1.0 16.0 8 60 25 1 1.00 0.75 36.18756 ## 50 2.0 11.0 10 120 25 3 1.00 0.75 36.17620 ## 51 1.0 13.0 12 20 25 2 1.00 1.00 35.78279 ## 52 0.0 11.0 15 40 25 1 1.00 0.88 35.25244 ## 53 3.0 16.0 11 170 25 3 1.00 1.00 34.13976 ## 54 2.0 8.0 8 135 0 3 1.00 1.00 33.98368 ## 55 1.0 11.0 14 30 25 2 1.00 1.00 33.17409 ## 56 1.0 11.0 13 30 25 2 1.00 1.00 32.20758 ## 57 1.0 14.0 11 25 25 1 1.00 0.75 31.43597	## 42	0.0	21.0	3	60	25	3	1.00 0.75 39.10617
## 45 3.0	## 43	0.0	21.0	3	35		3	1.00 1.00 38.83975
## 46 2.0	## 44	6.0	11.0	14	260	25	3	1.33 0.67 37.84059
## 47 1.0 17.0 6 60 100 3 1.00 1.00 36.52368 ## 48 2.0 20.0 9 95 100 3 1.30 0.75 36.47151 ## 49 1.0 16.0 8 60 25 1 1.00 0.75 36.18756 ## 50 2.0 11.0 10 120 25 3 1.00 0.75 36.17620 ## 51 1.0 13.0 12 20 25 2 1.00 1.00 35.78279 ## 52 0.0 11.0 15 40 25 1 1.00 0.88 35.25244 ## 53 3.0 16.0 11 170 25 3 1.00 1.00 34.13976 ## 54 2.0 8.0 8 135 0 3 1.00 1.00 33.98368 ## 55 1.0 11.0 14 30 25 2 1.00 1.00 33.17409 ## 56 1.0 11.0 13 30 25 2 1.00 1.00 32.20758 ## 57 1.0 14.0 11 25 25 1 1.00 0.75 31.43597	## 45	3.0	16.0	11	170	25	3	1.00 1.00 37.13686
## 48 2.0 20.0 9 95 100 3 1.30 0.75 36.47151 ## 49 1.0 16.0 8 60 25 1 1.00 0.75 36.18756 ## 50 2.0 11.0 10 120 25 3 1.00 0.75 36.17620 ## 51 1.0 13.0 12 20 25 2 1.00 1.00 35.78279 ## 52 0.0 11.0 15 40 25 1 1.00 0.88 35.25244 ## 53 3.0 16.0 11 170 25 3 1.00 1.00 34.13976 ## 54 2.0 8.0 8 135 0 3 1.00 1.00 33.98368 ## 55 1.0 11.0 14 30 25 2 1.00 1.00 33.17409 ## 56 1.0 11.0 13 30 25 2 1.00 1.00 32.20758 ## 57 1.0 14.0 11 25 25 1 1.00 0.75 31.43597	## 46	2.0	18.0	8	100	25	3	1.33 0.75 37.03856
## 49 1.0 16.0 8 60 25 1 1.00 0.75 36.18756 ## 50 2.0 11.0 10 120 25 3 1.00 0.75 36.17620 ## 51 1.0 13.0 12 20 25 2 1.00 1.00 35.78279 ## 52 0.0 11.0 15 40 25 1 1.00 0.88 35.25244 ## 53 3.0 16.0 11 170 25 3 1.00 1.00 34.13976 ## 54 2.0 8.0 8 135 0 3 1.00 1.00 33.98368 ## 55 1.0 11.0 14 30 25 2 1.00 1.00 33.17409 ## 56 1.0 11.0 13 30 25 2 1.00 1.00 32.20758 ## 57 1.0 14.0 11 25 25 1 1.00 0.75 31.43597	## 47	1.0	17.0	6	60	100	3	1.00 1.00 36.52368
## 50 2.0 11.0 10 120 25 3 1.00 0.75 36.17620 ## 51 1.0 13.0 12 20 25 2 1.00 1.00 35.78279 ## 52 0.0 11.0 15 40 25 1 1.00 0.88 35.25244 ## 53 3.0 16.0 11 170 25 3 1.00 1.00 34.13976 ## 54 2.0 8.0 8 135 0 3 1.00 1.00 33.98368 ## 55 1.0 11.0 14 30 25 2 1.00 1.00 33.17409 ## 56 1.0 11.0 13 30 25 2 1.00 1.00 32.20758 ## 57 1.0 14.0 11 25 25 1 1.00 0.75 31.43597	## 48	2.0	20.0	9	95	100	3	1.30 0.75 36.47151
## 51 1.0 13.0 12 20 25 2 1.00 1.00 35.78279 ## 52 0.0 11.0 15 40 25 1 1.00 0.88 35.25244 ## 53 3.0 16.0 11 170 25 3 1.00 1.00 34.13976 ## 54 2.0 8.0 8 135 0 3 1.00 1.00 33.98368 ## 55 1.0 11.0 14 30 25 2 1.00 1.00 33.17409 ## 56 1.0 11.0 13 30 25 2 1.00 1.00 32.20758 ## 57 1.0 14.0 11 25 25 1 1.00 0.75 31.43597	## 49	1.0	16.0	8	60	25	1	1.00 0.75 36.18756
## 51 1.0 13.0 12 20 25 2 1.00 1.00 35.78279 ## 52 0.0 11.0 15 40 25 1 1.00 0.88 35.25244 ## 53 3.0 16.0 11 170 25 3 1.00 1.00 34.13976 ## 54 2.0 8.0 8 135 0 3 1.00 1.00 33.98368 ## 55 1.0 11.0 14 30 25 2 1.00 1.00 33.17409 ## 56 1.0 11.0 13 30 25 2 1.00 1.00 32.20758 ## 57 1.0 14.0 11 25 25 1 1.00 0.75 31.43597	## 50			10	120		3	
## 52 0.0 11.0 15 40 25 1 1.00 0.88 35.25244 ## 53 3.0 16.0 11 170 25 3 1.00 1.00 34.13976 ## 54 2.0 8.0 8 135 0 3 1.00 1.00 33.98368 ## 55 1.0 11.0 14 30 25 2 1.00 1.00 33.17409 ## 56 1.0 11.0 13 30 25 2 1.00 1.00 32.20758 ## 57 1.0 14.0 11 25 25 1 1.00 0.75 31.43597	## 51	1.0			20	25	2	
## 53 3.0 16.0 11 170 25 3 1.00 1.00 34.13976 ## 54 2.0 8.0 8 135 0 3 1.00 1.00 33.98368 ## 55 1.0 11.0 14 30 25 2 1.00 1.00 33.17409 ## 56 1.0 11.0 13 30 25 2 1.00 1.00 32.20758 ## 57 1.0 14.0 11 25 25 1 1.00 0.75 31.43597	## 52	0.0		15	40	25	1	
## 54 2.0 8.0 8 135 0 3 1.00 1.00 33.98368 ## 55 1.0 11.0 14 30 25 2 1.00 1.00 33.17409 ## 56 1.0 11.0 13 30 25 2 1.00 1.00 32.20758 ## 57 1.0 14.0 11 25 25 1 1.00 0.75 31.43597							3	
## 55 1.0 11.0 14 30 25 2 1.00 1.00 33.17409 ## 56 1.0 11.0 13 30 25 2 1.00 1.00 32.20758 ## 57 1.0 14.0 11 25 25 1 1.00 0.75 31.43597								
## 56 1.0 11.0 13 30 25 2 1.00 1.00 32.20758 ## 57 1.0 14.0 11 25 25 1 1.00 0.75 31.43597	## 55							
## 57 1.0 14.0 11 25 25 1 1.00 0.75 31.43597								
							2	

##	59	1.5	11.5	10	90	25	1	1.00	0.75	31.07222
##	60	1.5	13.5	10	120	25	3	1.25	0.50	30.45084
##	61	3.0	17.0	13	160	25	3	1.50	0.67	30.31335
##	62	0.0	15.0	9	40	25	2	1.00	0.67	29.92429
##	63	1.5	10.5	10	70	25	1	1.00	0.75	29.50954
##	64	0.0	14.0	11	35	25	1	1.00	1.33	28.74241
##	65	4.0	15.0	14	230	100	3	1.50	1.00	28.59278
##	66	0.0	13.0	12	25	25	2	1.00	0.75	28.02576
##	67	0.0	13.0	12	25	25	2	1.00	1.00	27.75330
##	68	0.0	12.0	12	55	25	2	1.00	1.00	26.73451
##	69	0.0	15.0	9	45	25	2	1.00	0.75	23.80404
##	70	0.0	12.0	13	55	25	2	1.00	1.00	22.73645
##	71	0.0	12.0	13	65	25	2	1.00	1.00	22.39651
##	72	1.0	12.0	11	45	25	2	1.00	1.00	21.87129
##	73	0.0	13.0	9	45	25	2	1.00	0.75	19.82357
##	74	0.0	12.0	12	35	25	2	1.00	0.75	18.04285

Q12. Add new variables in your data frame by using a mathematical function (for e.g. – multiply an existing column by 2 and add it as a new variable to your data frame).

Here, we have created a new variable called double_calories by using calories varibale, we multplied calories by 2 and stored in double_calories.

```
Cereals %>% mutate(double_calories = calories*2)
##
                                 Cereals Names mfr type calories protein fat sodium
## 1
                    All-Bran_with_Extra_Fiber
                                                       С
                                                                50
                                                                          4
## 2
                       Shredded_Wheat_'n'Bran
                                                        С
                                                                90
                                                                          3
                                                                              0
                                                                                      0
                                                  N
                    Shredded_Wheat_spoon_size
                                                       С
                                                                          3
                                                                              0
## 3
                                                  N
                                                                90
                                                                                      0
                                     100%_Bran
                                                  N
                                                       С
                                                                70
                                                                          4
                                                                              1
## 4
                                                                                    130
## 5
                                Shredded_Wheat
                                                  N
                                                       С
                                                                80
                                                                          2
                                                                              0
                                                                                      0
                                                                          2
                                  Puffed_Wheat
                                                       С
                                                                              0
## 6
                                                  Q
                                                                50
                                                                                      0
## 7
                                   Puffed_Rice
                                                  Q
                                                       С
                                                                50
                                                                          1
                                                                              0
                                                                                      0
                                                                          3
## 8
                             Nutri-grain_Wheat
                                                       C
                                                                90
                                                                                    170
## 9
                                      All-Bran
                                                       C
                                                                70
                                                                          4
                                                                                    260
                                                  K
                                                                              1
                                                                          2
## 10
                      Strawberry_Fruit_Wheats
                                                  N
                                                       С
                                                                90
                                                                              0
                                                                                     15
                          Frosted_Mini-Wheats
                                                  K
                                                        С
                                                                          3
                                                                              0
## 11
                                                               100
                                                                                      0
                                                                          2
## 12
                                Raisin_Squares
                                                        С
                                                                90
                                                                              0
                                                                                      0
                                         Maypo
                                                                          4
                                                                              1
                                                                                      0
## 13
                                                  Α
                                                       Η
                                                               100
                                    Grape-Nuts
                                                  Ρ
                                                        С
                                                               110
                                                                          3
                                                                              0
                                                                                    170
## 14
## 15
                                   Bran_Flakes
                                                  Ρ
                                                        С
                                                                90
                                                                          3
                                                                              0
                                                                                    210
                                                  K
                                                                          6
## 16
                                     Special_K
                                                        С
                                                               110
                                                                                    230
                             Grape_Nuts_Flakes
                                                  Р
                                                        \mathsf{C}
                                                                          3
## 17
                                                               100
                                                                              1
                                                                                    140
## 18
                                      Wheaties
                                                  G
                                                       С
                                                               100
                                                                          3
                                                                              1
                                                                                    200
                                                  G
                                                       С
                                                                          6
                                                                              2
## 19
                                      Cheerios
                                                               110
                                                                                    290
                                                  R
                                                       С
                                                                          3
## 20
                                    Wheat Chex
                                                               100
                                                                              1
                                                                                    230
                            Quaker_Oat_Squares
## 21
                                                       C
                                                               100
                                                                          4
                                                                              1
                                                                                    135
                                                                          2
## 22
                                     {\tt Bran\_Chex}
                                                  R
                                                       С
                                                                90
                                                                              1
                                                                                    200
                                                                          2
## 23
                                       Crispix
                                                  K
                                                        С
                                                               110
                                                                              0
                                                                                    220
## 24
                             Total_Whole_Grain
                                                        С
                                                               100
                                                                          3
                                                                              1
                                                                                    200
```

				~	4.0.0	_	_	
##		Corn_Flakes	K	С	100	2	0	290
	26	<pre>Great_Grains_Pecan</pre>	P	C	120	3	3	75
##	27	Life	Q	С	100	4	2	150
##	28	Double_Chex	R	C	100	2	0	190
##	29	Rice_Chex	R	C	110	1	0	240
##	30	Product_19	K	C	100	3	0	320
##	31	Corn_Chex	R	С	110	2	0	280
##	32	Fruitful_Bran	K	С	120	3	0	240
		Fruit_&_Fibre_Dates,_Walnuts,_and_Oats	Р	C	120	3	2	160
	34	Nutri-Grain_Almond-Raisin	K	C	140	3	2	220
	35	Rice_Krispies	K	C	110	2	0	290
	36	Cracklin'_Oat_Bran	K	C	110	3	3	140
	37	Clusters	G	C	110	3	2	140
	38	Multi-Grain_Cheerios	G	C	100	2	1	220
	39	Raisin_Nut_Bran	G	С	100	3	2	140
	40	Raisin_Bran	K	C	120	3	1	210
##	41	Kix	G	С	110	2	1	260
##	42	Triples	G	C	110	2	1	250
##	43	Total_Corn_Flakes	G	C	110	2	1	200
##	44	Post_NatRaisin_Bran	P	C	120	3	1	200
##	45	Muesli_Raisins,_Dates,_&_Almonds	R	C	150	4	3	95
##	46	Basic_4	G	С	130	3	2	210
##	47	Just_Right_CrunchyNuggets	K	С	110	2	1	170
##	48	Just_Right_Fruit_&_Nut	K	С	140	3	1	170
	49	Wheaties_Honey_Gold	G	C	110	2	1	200
	50	Crispy_Wheat_&_Raisins	G	C	100	2	1	140
	51	Corn_Pops	K	C	110	1	0	90
	52	Golden_Crisp		C	100	2	0	45
		_ - -	P					
	53	Muesli_Raisins,_Peaches,_&_Pecans	R	C	150	4	3	150
	54	100%_Natural_Bran	Q	C	120	3	5	15
	55	Apple_Jacks	K	C	110	2	0	125
	56	Froot_Loops	K	С	110	2	1	125
	57	Frosted_Flakes	K	C	110	1	0	200
##	58	Smacks	K	C	110	2	1	70
##	59	Honey_Nut_Cheerios	G	C	110	3	1	250
##	60	Oatmeal_Raisin_Crisp	G	C	130	3	2	170
##	61	Mueslix_Crispy_Blend	K	C	160	3	2	150
##	62	Nut&Honey_Crunch	K	C	120	2	1	190
##	63	Apple_Cinnamon_Cheerios	G	C	110	2	2	180
##	64	Honey-comb	Р	С	110	1	0	180
##	65	Total_Raisin_Bran	G	С	140	3	1	190
	66	Fruity_Pebbles	Р	С	110	1	1	135
	67	Trix	G	C	110	1	1	140
	68	Lucky_Charms	G	C	110	2	1	180
	69	Golden_Grahams	G	C	110	1	1	280
	70	Cocoa_Puffs	G	C	110	1	1	180
		_	G	C		1	1	180
	71	Count_Chocula			110			
	72	Honey_Graham_Ohs	Q	C	120	1	2	220
##		Cinnamon_Toast_Crunch	G	C	120	1	3	210
##	74	Cap'n'Crunch	Q	C	120	1	2	220
##		fiber carbohydrates sugars potass vitam					ing	
##		14.0 8.0 0 330	25	3	1.00 0.50			
##	2	4.0 19.0 0 140	0	1	1.00 0.67			
##	3	3.0 20.0 0 120	0	1	1.00 0.67	72.80	179	

## 4	10.0	5.0	6	280	25	3	1.00 0.33 68.40297
## 5	3.0	16.0	0	95	0	1	0.83 1.00 68.23588
## 6	1.0	10.0	0	50	0	3	0.50 1.00 63.00565
## 7	0.0	13.0	0	15	0	3	0.50 1.00 60.75611
## 8	3.0	18.0	2	90	25	3	1.00 1.00 59.64284
## 9	9.0	7.0	5	320	25	3	1.00 0.33 59.42551
## 10	3.0	15.0	5	90	25	2	1.00 1.00 59.36399
## 11	3.0	14.0	7	100	25	2	1.00 0.80 58.34514
## 12	2.0	15.0	6	110	25	3	1.00 0.50 55.33314
## 13	0.0	16.0	3	95	25	2	1.00 1.00 54.85092
## 14	3.0	17.0	3	90	25	3	1.00 0.25 53.37101
## 15	5.0	13.0	5	190	25	3	1.00 0.67 53.31381
## 16	1.0	16.0	3	55	25	1	1.00 1.00 53.13132
## 17	3.0	15.0	5	85	25	3	1.00 0.88 52.07690
## 18	3.0	17.0	3	110	25	1	1.00 1.00 51.59219
## 19	2.0	17.0	1	105	25	1	1.00 1.25 50.76500
## 20	3.0	17.0	3	115	25	1	1.00 0.67 49.78744
## 21	2.0	14.0	6	110	25	3	1.00 0.50 49.51187
## 22	4.0	15.0	6	125	25	1	1.00 0.67 49.12025
## 23	1.0	21.0	3	30	25	3	1.00 1.00 46.89564
## 24 ## 25	3.0 1.0	16.0 21.0	2	110 35	100 25	3 1	1.00 1.00 46.65884 1.00 1.00 45.86332
## 25	3.0	13.0	4	100	25 25	3	1.00 1.00 45.86332
## 20	2.0	12.0	6	95	25	2	1.00 0.33 45.81172
## 28	1.0	18.0	5	80	25	3	1.00 0.07 43.32007
## 29	0.0	23.0	2	30	25	1	1.00 0.73 44.33000
## 30	1.0	20.0	3	45	100	3	1.00 1.10 41.50354
## 31	0.0	22.0	3	25	25	1	1.00 1.00 41.44502
## 32	5.0	14.0	12	190	25	3	1.33 0.67 41.01549
## 33	5.0	12.0	10	200	25	3	1.25 0.67 40.91705
## 34	3.0	21.0	7	130	25	3	1.33 0.67 40.69232
## 35	0.0	22.0	3	35	25	1	1.00 1.00 40.56016
## 36	4.0	10.0	7	160	25	3	1.00 0.50 40.44877
## 37	2.0	13.0	7	105	25	3	1.00 0.50 40.40021
## 38	2.0	15.0	6	90	25	1	1.00 1.00 40.10596
## 39	2.5	10.5	8	140	25	3	1.00 0.50 39.70340
## 40	5.0	14.0	12	240	25	2	1.33 0.75 39.25920
## 41	0.0	21.0	3	40	25	2	1.00 1.50 39.24111
## 42	0.0	21.0	3	60	25	3	1.00 0.75 39.10617
## 43	0.0	21.0	3	35	100	3	1.00 1.00 38.83975
## 44	6.0	11.0	14	260	25	3	1.33 0.67 37.84059
## 45	3.0	16.0	11	170	25	3	1.00 1.00 37.13686
## 46	2.0	18.0	8	100	25	3	1.33 0.75 37.03856
## 47	1.0	17.0 20.0	6 9	60 95	100	3	1.00 1.00 36.52368
## 48	2.0		8		100	3	1.30 0.75 36.47151
## 49 ## 50	1.0 2.0	16.0 11.0	10	60 120	25 25	1 3	1.00 0.75 36.18756 1.00 0.75 36.17620
## 50	1.0	13.0	12	20	25	2	1.00 0.73 30.17020
## 51	0.0	11.0	15	40	25 25	1	1.00 1.00 35.76279
## 52	3.0	16.0	11	170	25	3	1.00 0.88 35.23244
## 54	2.0	8.0	8	135	0	3	1.00 1.00 34.13370
## 55	1.0	11.0	14	30	25	2	1.00 1.00 33.30300
## 56	1.0	11.0	13	30	25	2	1.00 1.00 32.20758
## 57	1.0	14.0	11	25	25	1	1.00 0.75 31.43597

##	58	1.0	9.0	15	40	25	2	1.00 0.75 31.23005
##	59	1.5	11.5	10	90	25	1	1.00 0.75 31.07222
##	60	1.5	13.5	10	120	25	3	1.25 0.50 30.45084
##		3.0	17.0	13	160	25	3	1.50 0.67 30.31335
	62	0.0	15.0	9	40	25	2	1.00 0.67 29.92429
	63	1.5	10.5	10	70	25	1	1.00 0.75 29.50954
	64	0.0	14.0	11	35	25	1	1.00 1.33 28.74241
##		4.0	15.0	14	230	100	3	1.50 1.00 28.59278
	66	0.0		12	25		2	1.00 0.75 28.02576
			13.0	12	25 25	25 25	2	1.00 0.75 28.02576
	67	0.0	13.0			25	2	
	68	0.0	12.0	12	55	25		1.00 1.00 26.73451
	69	0.0	15.0	9	45	25	2	1.00 0.75 23.80404
	70	0.0	12.0	13	55	25	2	1.00 1.00 22.73645
	71	0.0	12.0	13	65	25	2	1.00 1.00 22.39651
	72	1.0	12.0	11	45	25	2	1.00 1.00 21.87129
	73	0.0	13.0	9	45	25	2	1.00 0.75 19.82357
	74	0.0	12.0	12	35	25	2	1.00 0.75 18.04285
##		double_c						
##	1		100					
	2		180					
	3		180					
##			140					
##			160					
	6		100					
	7		100					
	8		180					
##			140					
##			180					
	11		200					
	12		180					
##	13		200					
##	14		220					
##	15		180					
##	16		220					
##	17		200					
##	18		200					
##	19		220					
##	20		200					
##	21		200					
##	22		180					
##	23		220					
##	24		200					
##	25		200					
##	26		240					
##	27		200					
##	28		200					
##	29		220					
##	30		200					
##	31		220					
##	32		240					
##	33		240					
##	34		280					
##	35		220					
##	36		220					

```
## 37
                    220
## 38
                    200
## 39
                    200
## 40
                    240
## 41
                    220
                    220
## 42
## 43
                    220
## 44
                    240
## 45
                    300
## 46
                    260
## 47
                    220
                    280
## 48
## 49
                    220
## 50
                    200
## 51
                    220
## 52
                    200
## 53
                    300
## 54
                    240
                    220
## 55
## 56
                    220
## 57
                    220
## 58
                    220
                    220
## 59
## 60
                    260
## 61
                    320
## 62
                    240
## 63
                    220
                    220
## 64
## 65
                    280
## 66
                    220
## 67
                    220
## 68
                    220
## 69
                    220
## 70
                    220
## 71
                    220
## 72
                    240
## 73
                    240
## 74
                    240
```

Q13. Create a training set using random number generator engine.

created training and test dataset using random number engine.

```
set.seed(74)
h <- runif(nrow(Cereals))
c <- Cereals[order(h), ]
train <- c[1:45, ]
test <- c[46:74, ]
str(train)

## 'data.frame': 45 obs. of 16 variables:
## $ Cereals Names: Factor w/ 77 levels "100%_Bran","100%_Natural_Bran",..: 55 77 10 32 12 36 28 74 72</pre>
```

```
$ mfr
                  : Factor w/ 7 levels "A", "G", "K", "N", ...: 6 2 5 2 2 5 5 2 2 3 ...
## $ type
                  : Factor w/ 2 levels "C", "H": 1 1 1 1 1 1 1 1 1 1 ...
## $ calories
                 : int 50 110 90 110 110 110 120 110 100 110 ...
                  : int 1231613132...
## $ protein
## $ fat
                  : int
                        0 1 0 1 2 0 2 1 1 1 ...
## $ sodium
                 : int 0 200 210 280 290 180 160 140 200 70 ...
## $ fiber
                 : num 0 1 5 0 2 0 5 0 3 1 ...
## $ carbohydrates: num 13 16 13 15 17 14 12 13 16 9 ...
##
   $ sugars
                : int 0 8 5 9 1 11 10 12 3 15 ...
## $ potass
                 : int 15 60 190 45 105 35 200 25 110 40 ...
## $ vitamins
                 : int 0 25 25 25 25 25 25 25 100 25 ...
                 : int 3 1 3 2 1 1 3 2 3 2 ...
## $ shelf
## $ weight
                 : num 0.5 1 1 1 1 1 1.25 1 1 1 ...
## $ cups
                : num 1 0.75 0.67 0.75 1.25 1.33 0.67 1 1 0.75 ...
                : num 60.8 36.2 53.3 23.8 50.8 ...
## $ rating
str(test)
## 'data.frame':
                   29 obs. of 16 variables:
## $ Cereals Names: Factor w/ 77 levels "100%_Bran","100%_Natural_Bran",..: 41 71 3 4 37 22 18 39 60 3
                 : Factor w/ 7 levels "A", "G", "K", "N",...: 2 2 3 3 6 3 3 3 2 5 ...
## $ mfr
                 : Factor w/ 2 levels "C", "H": 1 1 1 1 1 1 1 1 1 ...
## $ type
## $ calories
                : int 110 140 70 50 120 110 110 110 100 110 ...
## $ protein
                : int 2 3 4 4 1 2 1 2 3 3 ...
## $ fat
                  : int
                        1 1 1 0 2 0 0 1 2 0 ...
## $ sodium
                 : int
                        260 190 260 140 220 220 90 170 140 170 ...
## $ fiber
                 : num 0 4 9 14 1 1 1 1 2.5 3 ...
## $ carbohydrates: num 21 15 7 8 12 21 13 17 10.5 17 ...
## $ sugars
                 : int
                        3 14 5 0 11 3 12 6 8 3 ...
## $ potass
                : int 40 230 320 330 45 30 20 60 140 90 ...
## $ vitamins
                : int 25 100 25 25 25 25 25 100 25 25 ...
## $ shelf
                 : int 2 3 3 3 2 3 2 3 3 3 ...
## $ weight
                 : num 1 1.5 1 1 1 1 1 1 1 1 ...
## $ cups
                 : num 1.5 1 0.33 0.5 1 1 1 1 0.5 0.25 ...
## $ rating
                  : num 39.2 28.6 59.4 93.7 21.9 ...
```

Q14.Print the summary statistics of your dataset.

Summary Statistics of dataset.

summary(Cereals)

```
##
                     Cereals Names mfr
                                          type
                                                   calories
                                                                 protein
## 100%_Bran
                            : 1
                                   A: 1
                                          C:73
                                                 Min.
                                                      : 50
                                                              Min.
                                                                    :1.000
## 100%_Natural_Bran
                                   G:22
                                          H: 1
                            : 1
                                                 1st Qu.:100
                                                              1st Qu.:2.000
## All-Bran
                                   K:23
                            : 1
                                                 Median :110
                                                              Median :2.500
## All-Bran_with_Extra_Fiber: 1
                                   N: 5
                                                 Mean :107
                                                              Mean
                                                                    :2.514
## Apple_Cinnamon_Cheerios : 1
                                   P: 9
                                                3rd Qu.:110
                                                              3rd Qu.:3.000
## Apple_Jacks
                            : 1
                                   Q: 7
                                                Max. :160
                                                              Max. :6.000
## (Other)
                            :68
                                   R: 7
##
                                                carbohydrates
        fat.
                   sodium
                                   fiber
                                                                   sugars
```

```
## Min. :0
            Min. : 0.0 Min.
                                 : 0.000
                                               : 5.00
                                         Min.
                                                       Min.
                                                             : 0.000
## 1st Qu.:0 1st Qu.:135.0 1st Qu.: 0.250 1st Qu.:12.00 1st Qu.: 3.000
## Median: 1 Median: 180.0 Median: 2.000 Median: 14.50 Median: 7.000
## Mean :1 Mean :162.4 Mean
                                : 2.176
                                         Mean :14.73 Mean
                                                            : 7.108
## 3rd Qu.:1
            3rd Qu.:217.5 3rd Qu.: 3.000
                                         3rd Qu.:17.00
                                                      3rd Qu.:11.000
## Max. :5 Max. :320.0 Max. :14.000
                                         Max. :23.00 Max. :15.000
##
##
      potass
                  vitamins
                                   shelf
                                                 weight
## Min. : 15.00 Min. : 0.00 Min. :1.000 Min.
                                                   :0.500
##
  1st Qu.: 41.25   1st Qu.: 25.00   1st Qu.:1.250   1st Qu.:1.000
## Median: 90.00 Median: 25.00 Median: 2.000 Median: 1.000
## Mean : 98.51
                 Mean : 29.05 Mean :2.216
                                             Mean :1.031
## 3rd Qu.:120.00 3rd Qu.: 25.00 3rd Qu.:3.000
                                             3rd Qu.:1.000
## Max. :330.00 Max. :100.00 Max. :3.000 Max. :1.500
##
##
       cups
                     rating
## Min. :0.2500 Min. :18.04
  1st Qu.:0.6700
                 1st Qu.:32.45
## Median :0.7500 Median :40.25
## Mean :0.8216 Mean :42.37
## 3rd Qu.:1.0000 3rd Qu.:50.52
## Max. :1.5000 Max. :93.70
##
```

Q15. Use any of the numerical variables from the dataset and perform the following statistical functions

we are using protein for our statistical analysis

```
# 1.Mean
cat("The mean value for protein is:", mean(Cereals$protein), "\n");

## The mean value for protein is: 2.513514

# 2. Median
cat("The median value for protein is:", median(Cereals$protein), "\n");

## The median value for protein is: 2.5

# 3.Mode
# R does not have any in-built function for mode, so we had to create a function for it.
getmode <- function(v) {
   uniqv <- unique(v)
   uniqv[which.max(tabulate(match(v, uniqv)))]
}
v <- Cereals$protein
result <- getmode(v)

cat("The mode value for protein is:", result, "\n");</pre>
```

The mode value for protein is: 3

```
# 4.Range
cat("The range values for protein is:", range(Cereals$protein))
```

The range values for protein is: 1 6

Q16. Plot a scatter plot for any 2 variables in your dataset.

The scatterplot for Calories and carbohydrates.

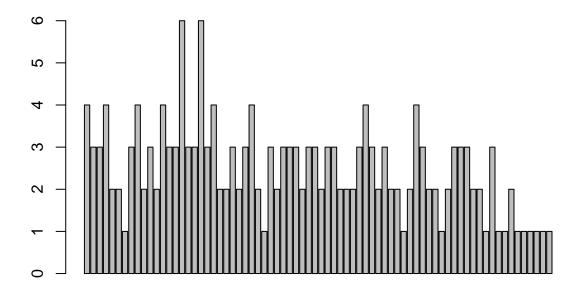
```
plot(Cereals$calories, Cereals$carbohydrates)
```



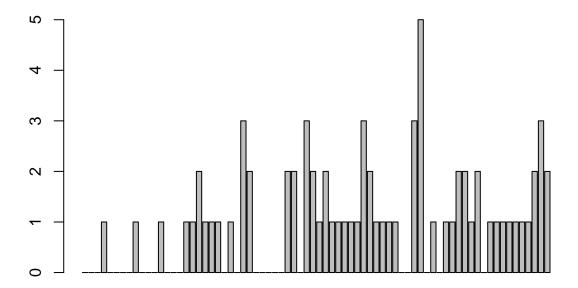
Q17. Plot a bar plot for any 2 variables in your dataset.

Created 3 different barplots with 3 different variables.

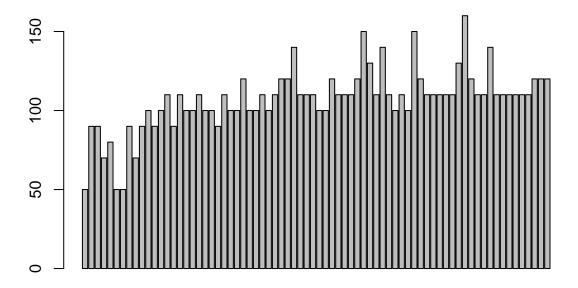
barplot(Cereals\$protein)



barplot(Cereals\$fat)



barplot(Cereals\$calories)



Q18. Find the correlation between any 2 variables by applying least square linear regression model.

```
X = Cereals[,"carbohydrates"]
Y = Cereals[,"calories"]
CORRELATION = cor(Y,X,method = "pearson")
CORRELATION
```

[1] 0.270606

Q19. Provide a conclusion of your analysis.

Well, the complete analysis has to be done, which will require us to look at all the variables, finding correlations of variables with each other. plotting more graphs.But, with the given analysis, we can say that carbohydrates and calories are somewhat proportional with a positive correlation.