

# Assignment 1

- Please produce your assignment as a pdf (knit to pdf). See instructions in announcements if you have not downloaded a LaTeX distributor. If you are still having issues, you may knit to HTML and use your browser to produce a pdf file, as it is detailed in the M 01 09 video of module 1.
- Please also submit your qmd file (it will not be graded but we want it for reference purposes).
- Please use the provided qmd file as a basis for your first assignment (do not submit an R script file), putting your solutions inside the empty blocks that follow “Solution:”
- You will have to produce your future qmd files.
- 20 points per exercise

Keep the following code for reproducibility when using randomly generated numbers.

```
set.seed(1)
```

## Exercise 1:

Devise an approximate value of  $\pi$  by generating 1000 x-values on the uniform interval from 0 to 1 and 1000 y-values on the uniform interval from 0 to 1. Use `?runif` for help in using the `runif()` function.

Hint: For a circle of radius 1,  $\pi$  is equal to the area.

Solution:

```
points <- 1000
x_val <- runif(points, 0, 1)
y_val <- runif(points, 0, 1)

in_cycle <- sum((x_val^2 + y_val^2) <= 1)
```

```
approx_pi <- 4* in_cycle/points
approx_pi
```

```
[1] 3.148
```

### Exercise 2:

Systematic sample. Given the data:

```
data <- c(23, 89, 1, 34,
          26, 85, 24, 43,
          23, 93, 29, 45,
          32, 42, 43, NA,
          21, 54, 37, 76)
```

get a systematic sample of size  $n = 5$  from `data` by extracting each value that lies every  $K = N/n$  elements (where  $N$  is the total number of elements in `data`).

Your first element needs to be randomly determined as a number between 1 and  $K$ .

Note: Your result needs to be a vector containing the 5 elements that are part of your systematic sample. Also, the subsetting from the vector `data` must be a one liner (you need to extract all elements together).

Solution:

```
set.seed(1)
data <- c(23, 89, 1, 34,
          26, 85, 24, 43,
          23, 93, 29, 45,
          32, 42, 43, NA,
          21, 54, 37, 76)

N <- length(data)
n <- 5
K <- ceiling(N/n)
xing_sample <- data[sample(1:K, 1)+seq(0, by=K, length.out=n)]
xing_sample
```

```
[1] 23 26 23 32 21
```

### Exercise 3:

Run the following code to load the ‘babyboom’ dataset from the UsingR package. This dataset contains the time of birth, sex, and birth weight for 44 babies born in one 24-hour window at a hospital in Australia.

```
#install.packages("UsingR") # Only run this once; remove when knitting
library(UsingR)
data(babyboom)
```

What were the weights, in grams, of the lightest and heaviest babies recorded?

The “gender” column classifies each baby as a ‘boy’ or a ‘girl’. How many of each gender are there? Plot a histogram of weights for girls and a separate histogram of weights for boys, both using Scott’s rule for the number of bins. Which histogram looks more bell-shaped?

Solution:

```
library(UsingR)
data(babyboom)
(lightest <- min(babyboom$wt))
```

```
[1] 1745
```

```
(heaviest <- max(babyboom$wt))
```

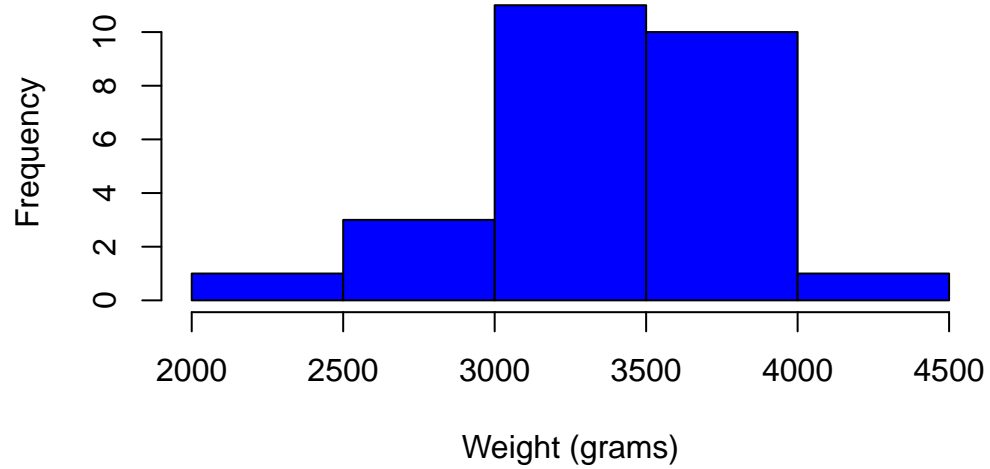
```
[1] 4162
```

```
(gender_counts <- table(babyboom$gender))
```

```
girl  boy
  18   26
```

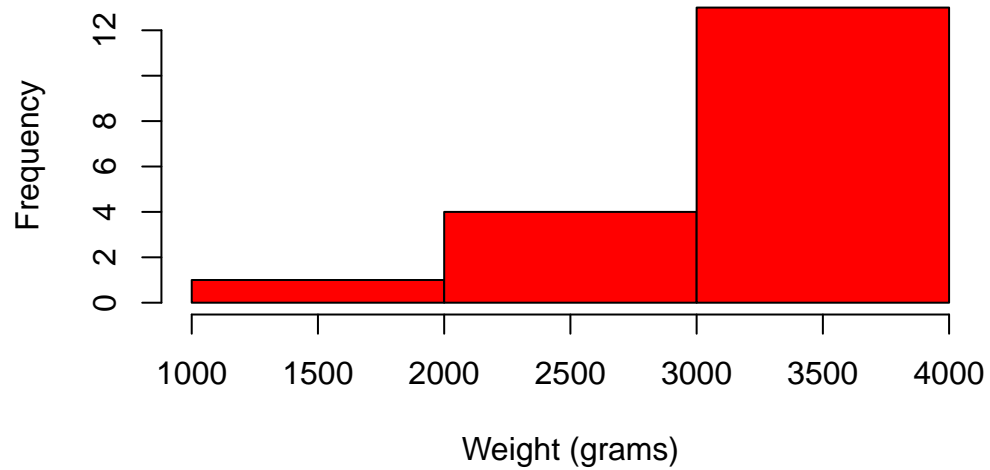
```
hist(babyboom$wt[babyboom$gender == "boy"],
     main = "Histogram of Baby Weights for Boys",
     xlab = "Weight (grams)",
     breaks = "scott",
     col = "blue")
```

### Histogram of Baby Weights for Boys



```
hist(babyboom$wt[babyboom$gender == "girl"],  
     main = "Histogram of Baby Weights for girls",  
     xlab = "Weight (grams)",  
     breaks = "scott",  
     col = "red")
```

### Histogram of Baby Weights for girls



Exercise 4:

Consider the following string *a*.

```
a <- c("group1", "group2", "group3")
```

Take a random sample of size 20 from *a*. Convert this random sample to a factor. Sort this factor in decreasing order. Use `plot()` to construct a bar chart of the frequencies of each level of the factor.

Solution:

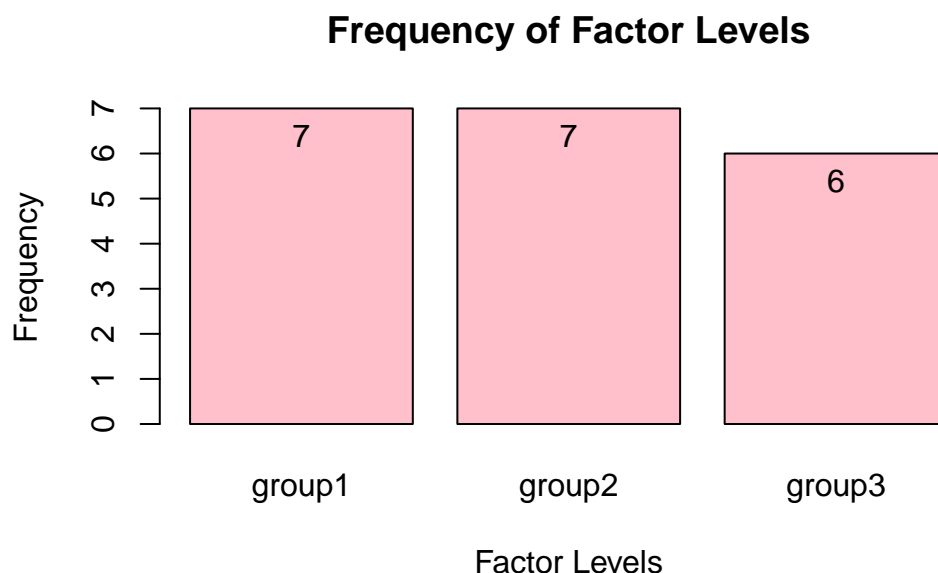
```
set.seed(1)
a <- c("group1", "group2", "group3")
random_a <- sample(a, 20, replace = TRUE)

(random_a_factor <- factor(random_a))
```

```
[1] group1 group3 group1 group2 group1 group3 group3 group2 group2 group3
[11] group3 group1 group1 group1 group2 group2 group2 group2 group3 group1
Levels: group1 group2 group3
```

```
sorted_factor <- factor(random_a_factor,
                        levels = names(sort(table(random_a_factor),
                                                decreasing = TRUE)))
bar_chart <- barplot(table(sorted_factor), main = "Frequency of Factor Levels",
                    xlab = "Factor Levels", ylab = "Frequency", col = "pink")

text(bar_chart, table(sorted_factor), labels = table(sorted_factor), pos = 1)
```



#### Exercise 5:

Load the 'snacks' dataset using the following code.

```
library(UsingR)
data(snacks)
```

Using logical indexes, how many snacks have an NA value for sugar? How many have more protein than sugar (confirm that your answer is not "NA")? What is the average amount of sodium in snacks with over 500 calories? What about in snacks with less than 300 calories? How many snacks have either 40 carbohydrates or fewer OR 350 or more calories? Finally, write a line of code to see how many snacks satisfy ALL of the following criteria: less than 400 calories, less than 20 sugar, 12 or more protein.

Solution:

```
library(UsingR)
data(snacks)
snacks
```

	description	calories
5530	CAKE,SNACK CAKES,CREME-FILLED,CHOC W/ FRSTNG	399
5531	CAKE,SNACK CAKES,CREME-FILLED,SPONGE	374
5618	CRACKERS,STD SNACK-TYPE,REG	510
5619	CRACKERS,STD SNACK-TYPE,SNDWCH,W/CHS FILLING	477
5620	CRACKERS,STD SNACK-TYPE,SNDWCH,W/PNUT BUTTER FILLING	494

5782	CRACKERS,STD SNACK-TYPE,REG,LO SALT	502
5868	NABISCO,NABISCO SNACKWELL'S FAT FREE DEVIL'S FD COOKIE CAKES	305
5898	CRACKERS,SNACK,GOYA CRACKERS	433
5942	SNACKS,CORN-BASED,EXTRUDED,ONION-FLAVOR	499
5958	SNACKS,GENERAL MILLS,CHEX MIX,TRADITIONAL FLAVOR	424
5960	SNACKS,POPCORN,OIL-POPPED,MICROWAVE,REG FLAVOR,NO TRANS FAT	583
5972	SNACKS,M&M MARS,COMBOS SNACKS CHEDDAR CHS PRETZEL	463
5973	SNACKS,PRETZELS,HARD,WHOLE-WHEAT INCL BOTH SALTED & UNSALTED	362
5977	SNACKS,TORTILLA CHIPS,PLN,WHITE CORN,SALTED	473
5978	SNACKS,TORTILLA CHIPS,NACHO CHS	514
5979	SNACKS,TORTILLA CHIPS,RANCH-FLAVOR	501
6031	CANDIES,MARS SNACKFOOD US,MARS ALMOND BAR	467
6049	CANDIES,MARS SNACKFOOD US,MILKY WAY BAR	456
6053	BAK CHOC,MARS SNACKFOOD US,M&M'S SEMISWT CHOC MINI BAK BITS	517
6054	CANDIES,MARS SNACKFOOD US,M&M'S Pnut CHOC CANDIES	515
6055	CANDIES,MARS SNACKFOOD US,M&M'S MILK CHOC CANDIES	492
6060	BAKING CHOC,MARS SNACKFOOD US,M&M'S MILK CHOC MINI BAK BITS	502
6069	CANDIES,MARS SNACKFOOD US,SNICKERS BAR	491
6070	CANDIES,MARS SNACKFOOD US,STARBURST FRUIT CHEWS,ORIG FRUIT	408
6071	CANDIES,MARS SNACKFOOD US,M&M'S MINIS MILK CHOC CANDIES	502
6072	CANDIES,MARS SNACKFOOD US,3 MUSKETEERS BAR	436
6073	CANDIES,MARS SNACKFOOD US,TWIX CARAMEL COOKIE BARS	502
6074	CANDIES,MARS SNACKFOOD US,TWIX Pnut BUTTER COOKIE BARS	536
6148	CANDIES,MARS SNACKFOOD US,DOVE MILK CHOC	546
6149	CANDIES,MARS SNACKFOOD US,DOVE DK CHOC	520
6150	CANDIES,MARS SNACKFOOD US,MILKYWAYCARAML,MILKCHOCOV	463
6151	CANDIES,MARS SNACKFOOD US,MILKY WAY CARM. DKCHOCOV	458
6156	SNACKS,GENERAL MILLS,BETTY CROCKER FRT RL UPS,BRY FLV,W/VT C	373
6159	SNACKS,FARLEY CANDY,FARLEY FRUIT SNACKS,W/VITAMINS A,C,&E	341
6160	SNACKS,SUNKIST,SUNKIST FRUIT ROLL,STRAWBERRY,W/VITMNS A,C,&E	342
6161	SNACKS,FRUIT LEATHER,PIECES,W/VIT C	373
6166	CANDIES,MARS SNACKFOOD US,M&M'S CRISPY CHOC CANDIES	475
6169	CANDIES,MARS SNACKFOOD US,SNICKERS MUNCH BAR	536
6174	CANDIES,MARS SNACKFOOD US,SNICKERS ALMOND BAR	472
6177	CANDIES,MARS SNACKFOOD US,POP SNICKERS BITE SIZE CANDIES	480
6178	CANDIES,MARS SNACKFOOD US,POP MILKY WAY BITE SIZE	463
6179	CANDIES,MARS SNACK US,POP'ABLES 3 MUSKETEERS BITE SIZE	443
6180	CANDIES,MARS SNACK US,STARBURST FRUIT CHEWS,FRT&CREM	408
6183	CANDIES,MARS SNACKFOOD US,STARBURST FRUIT CHEWS,TROP	409
6185	CANDIES,MARS SNACKFOOD US,STARBURST SOUR FRUIT CHEWS	400
6194	CANDIES,MARS SNACKFOOD US,COCOAVIA CHOC BAR	539
6195	CANDIES,MARS SNACK US,COCOAVIA BLUEBERRY & ALMOND CHOC BAR	525
6196	CANDIES,MARS SNACKFOOD US,COCOAVIA CRISPY CHOC BAR	517

6214	CANDIES,MARS SNACKFOOD US,SNICKERS CRUNCHER	488
6218	CANDIES,MARS SNACKFOOD US,SKITTLES WILD BERRY BITE SIZE	402
6223	CANDIES,MARS SNACKFOOD US,SKITTLES TROPICAL BITE SIZE CAND	405
6224	CANDIES,MARS SNACKFOOD US,SKITTLES SOURS ORIGINAL	401
6225	CANDIES,MARS SNACKFOOD US,SKITTLES ORIGINAL BITE SIZE CAND	405
6241	SNACKS,BF STKS,SMOKED	550
6244	SNACK,POTATO CHIPS,MADE FROM DRIED POTATOES,PLN	559
6247	SNACKS,RICE CAKES,BROWN RICE,CORN	385
6249	SNACKS,POTATO STKS	522
6255	SNACKS,POTATO CHIPS,RED FAT	471
6256	SNACKS,POTATO CHIPS,FAT-FREE,MADE W/OLESTRA	274
6257	SNACKS,TORTILLA CHIPS,NACHO-FLAVOR,RED FAT	445
6260	SNACKS,GRANOLA BAR,FRUIT-FILLED,NONFAT	342
6263	SNACKS,KELLOGG,KELLOGG'S RICE KRISPIES TREATS SQUARES	414
6264	SNACKS,KELLOGG'S LOFAT GRANOLA BAR,CRUNCHY ALMD/BRN SUGAR	390
6265	SNACKS,M&M MARS,KUDOS WHL GRAIN BARS,CHOC CHIP	420
6266	SNACKS,KELLOGG'S,NUTRI-GRAIN CRL BARS,FRUIT	324
6267	SNACKS,TORTILLA CHIPS,LOFAT,MADE W/OLESTRA,NACHO CHS	318
6268	SNACKS,POTATO CHIPS,FRM DRIED POTATOES,FAT-FREE,W/ OLESTRA	253
6282	SNACKS,CORN-BASED,EXTRDD,PUFFS OR TWISTS,CHEESE-FLAVOR,UNENR	558
6283	SNACKS,CORN-BASE,EXTRUD,CHIPS,BARBECUE-FLAVOR,W/ENR MASA FLR	523
6285	SNACKS,POPCORN,OIL-POPPED,WHITE POPCORN,SALT ADDED	500
6291	SNACKS,PRETZELS,HARD,PLN,MADE W/ ENR FLR,UNSALTED	381
6302	SNACKS,TORTILLA CHIPS,NACHO-FLAVOR,MADE W/ENR MASA FLR	498
6332	CANDIES,MARS SNACKFOOD US,COCOAVIA CHOC COVERED ALMONDS	573
6351	CANDIES,FRUIT SNACKS,W/ HI VIT C	352
7507	SNACKS,POPCORN,UNPOPPED KRNLs	375
7508	SNACKS,CANDY ROLLS,YOGURT-COVERED,FRUIT FLAV W/ HI VIT C	359
7509	FORM BAR,MARS SNACK US,SNICKERSMARATHONCHEWCHOCPNUT BAR	396
7511	FORM BAR,MARS SNACK US,SNICKERS MARATHON DOUBLE CHOC NUT BAR	343
7512	SNACKS,M&M MARS,KUDOS WHL GRAIN BARS,PNUT BUTTER	463
7513	FORM BAR,MARS SNACKFOOD US,SNICKERS MARATHON HON NUT OAT BAR	378
7514	SNACKS,M&M MARS,KUDOS WHL GRAIN BAR,M&M'S MILK CHOC	415
7515	FORM BAR,MARS SNACKFOOD US,COCOAVIA,CHOC ALMOND	347
7516	SNACKS,SWT POTATO CHIPS,UNSALTED	532
7517	SNACKS,FRITOLAY,SUNCHIPS,MULTIGRAIN SNACK,ORIGINAL FLAVOR	491
7518	SNACKS,POPCORN,MICROWAVE,REG (BUTTER) FLAVOR, W/PARHYD OIL	557
7519	FORMBAR,MARSSNACK,SNICKERS MARATHONPROTPERFBAR,CARMELNUTRUSH	415
7520	FORM BAR,MARS SNACK US,SNICKERS MARATHON ENERGY BAR,ALL FLAV	386
7522	FORM BAR,MARS SNACKFOOD US,COCOAVIA,CHOC BLUEBERRY	325
7525	SNACKS,FRITOLAY,SUNCHIPS,MULTIGRAIN,FRENCH ONION FLAVOR	496
7526	SNACKS,FRITOLAY,SUNCHIPS,MULTIGRAIN,HARVEST CHEDDAR	491
7528	SNACKS,SOY CHIPS OR CRISPS,SALTED	385



7530	SNACKS,PLANTAIN CHIPS,SALTED	531
7532	SNACKS,VEG CHIPS,HAIN CELESTIAL GROUP,TERRA CHIPS	517
7534	SNACKS,GRANOLA BAR,KASHI GOLEAN,CHEWY,MXD FLAVORS	390
7535	SNACKS,GRANOLA BAR,KASHI TLC BAR,CHEWY,MXD FLAVORS	429
7536	SNACKS,GRANOLA BAR,KASHI GOLEAN,CRUNCHY,MXD FLAVORS	393
7537	SNACKS,GRANOLA BAR,CHEWY,RED SUGAR,ALL FLAVORS	412
7538	SNACKS,GRANOLA BITES,MXD FLAVORS	451
7539	SNACKS,PITA CHIPS,SALTED	457
7540	SNACKS,GRANOLA BARS,SOFT,ALMOND,CONFECTIONERS COATING	455
7541	SNACKS,GRANOLA BARS,QUAKER OATMEAL TO GO,ALL FLAVORS	389
7542	SNACKS,VEG CHIPS,MADE FROM GARDEN VEG	473
7543	SNACKS,GRANOLA BAR,KASHI TLC BAR,CRUNCHY,MXD FLAVORS	446
7544	SNACKS,CANDY BITS,YOGURT COVERED W/ VIT C	415
7546	SNACKS,BAGEL CHIPS,PLN	451
7547	SNACKS,NUTRI-GRAIN FRUIT & NUT BAR	403
7548	SNACKS,YUCCA (CASSAVA) CHIPS,SALTED	515
7550	SNACKS,GRANOLA BAR,QUAKER,CHEWY,90 CAL BAR	408
7556	SNACK,PRETZEL,HARD CHOC COATD	467
7559	SNACKS,POTATO CHIPS,LIGHTLY SALTED	560
7680	KEEBLER,CLUB CRACKERS,SNACK STKS,HONEY WHEAT	471
7681	KEEBLER,CLUB CRACKERS,SNACK STKS,ORIGINAL	475
7861	SUNSHINE,CHEEZ-IT,SNACK MIX	438
7862	SUNSHINE,CHEEZ-IT,SNACK MIX,WHITE CHEDDAR	473
7904	CAKE,SNACK CAKES,CREME-FILLED,CHOC W/ FRSTNG,LOW-FAT	409
7905	CAKE,SNACK CAKES,NOT CHOC,W/ ICING OR FILLING,LOW-FAT	405
8246	CANDIES,MARS SNACKFOOD US,M&M'S PNUIT BUTTER CHOC CANDIES	529
8259	CANDIES,MARS SNACKFOOD US,TWIX CHOC FUDGE COOKIE BARS	550
8269	CANDIES,MARS SNACKFOOD US,MILKY WAY MIDNIGHT BAR	443
8273	CANDIES,MARS SNACKFOOD US,M&M'S ALMOND CHOC CANDIES	522
8283	SNACKS,POPCORN,HOME-PREPARED,OIL-POPPED,UNSALTED	500
8296	BABYFOOD,BKD PRODUCT,FINGER SNACKS CRL	421
8387	SNACKS,TORTILLA CHIPS,UNSALTED,WHITE CORN	503
8413	SNACKS,CORN-BASED,EXTRUDED,CHIPS,UNSALTED	557
8436	SNACKS,TORTILLA CHIPS,LT (BAKED W/ LESS OIL)	465
	protein carbohydrates sugar sodium fat_sat fat_mono fat_poly cholestrol	
5530	3.63 60.31 37.76 332 4.884 8.525 1.822	0
5531	3.47 64.03 37.30 470 4.139 4.906 1.860	41
5618	6.75 61.46 8.46 705 5.897 6.768 12.464	0
5619	9.30 61.70 3.18 978 6.125 11.254 2.567	2
5620	11.47 58.38 10.50 801 4.913 13.776 4.655	0
5782	7.40 61.00 1.79 216 3.776 10.640 9.545	0
5868	5.00 74.25 43.38 174 0.427 0.246 0.196	0
5898	14.25 64.35 2.35 665 6.323 4.697 1.536	NA

5942	7.70	65.10	4.83	950	4.340	13.360	3.140	0
5958	8.83	74.77	4.85	741	1.499	2.921	4.473	NA
5960	7.29	45.06	0.46	679	6.820	9.809	23.191	0
5972	9.85	66.50	17.60	1117	9.656	3.806	1.354	5
5973	11.10	81.30	NA	203	0.560	1.030	0.830	0
5977	7.04	67.52	0.80	325	3.127	6.208	9.838	0
5978	8.15	61.74	3.79	615	3.936	7.067	13.624	NA
5979	7.19	62.74	3.03	519	3.539	7.047	13.528	NA
6031	8.10	62.70	52.10	170	7.268	10.693	3.980	17
6049	4.01	71.17	59.69	167	12.016	2.230	0.260	9
6053	4.44	65.96	53.07	2	15.618	NA	NA	3
6054	9.57	60.48	50.75	50	10.169	8.086	3.456	8
6055	4.33	71.19	63.68	61	13.080	5.183	0.921	14
6060	4.78	68.40	62.54	68	14.466	NA	NA	15
6069	7.53	61.51	50.47	239	9.069	7.875	3.014	13
6070	0.41	82.57	58.12	2	7.778	0.000	0.000	0
6071	4.78	68.40	62.54	68	14.466	NA	NA	15
6072	2.60	77.77	66.89	194	8.646	2.373	0.316	5
6073	4.91	64.80	48.25	198	18.960	2.988	0.628	7
6074	9.18	54.15	36.13	226	15.758	12.317	3.407	6
6148	5.94	59.78	55.45	63	19.240	NA	NA	18
6149	5.19	59.40	46.27	4	19.209	NA	NA	7
6150	4.28	68.49	58.65	273	13.157	NA	NA	20
6151	3.82	67.56	54.08	246	13.814	NA	NA	17
6156	0.10	85.20	38.70	317	0.990	1.724	0.093	NA
6159	4.40	80.90	NA	36	NA	NA	NA	NA
6160	0.60	82.70	NA	111	NA	NA	NA	NA
6161	0.10	85.20	NA	317	0.990	1.724	0.093	0
6166	4.28	72.40	58.94	136	11.651	NA	NA	12
6169	15.25	43.64	30.87	358	8.819	NA	NA	24
6174	5.40	64.67	53.93	156	8.534	NA	NA	13
6177	7.15	61.07	51.69	224	9.891	NA	NA	13
6178	3.30	71.85	61.08	146	8.889	NA	NA	11
6179	2.59	75.94	67.00	172	9.921	NA	NA	7
6180	0.41	82.43	57.98	2	7.931	NA	NA	0
6183	0.41	82.76	58.18	2	8.048	NA	NA	0
6185	0.39	79.73	56.10	89	7.520	NA	NA	0
6194	5.81	62.99	39.19	7	15.703	NA	NA	0
6195	6.35	60.37	38.99	8	13.070	NA	NA	0
6196	8.21	62.06	34.96	40	14.007	NA	NA	0
6214	6.86	62.85	46.54	189	12.703	NA	NA	9
6218	0.19	90.76	75.92	15	4.115	NA	NA	0
6223	0.19	90.77	75.76	15	NA	NA	NA	0

6224	0.18	91.02	73.16	14	3.765	NA	NA	0
6225	0.19	90.78	75.84	15	4.115	0.000	0.000	0
6241	21.50	5.40	NA	1531	20.800	20.470	4.420	133
6244	4.45	52.02	1.14	529	9.492	7.048	13.594	0
6247	8.40	81.20	NA	167	0.630	1.140	1.130	0
6249	6.70	53.30	0.22	633	8.880	6.160	17.900	0
6255	7.10	66.90	0.22	492	4.160	4.800	10.940	0
6256	7.74	65.00	0.00	554	0.240	0.180	0.304	0
6257	8.70	71.60	NA	1003	2.910	8.950	2.100	3
6260	5.90	77.60	55.34	24	0.200	0.240	0.350	0
6263	3.40	80.50	19.36	351	1.400	2.500	5.100	0
6264	8.00	78.00	NA	291	1.100	1.800	4.500	0
6265	4.47	72.31	38.78	246	4.701	4.710	2.749	0
6266	4.69	69.54	30.84	315	1.600	2.200	4.800	1
6267	8.44	65.22	2.82	705	1.054	1.379	1.211	2
6268	5.06	56.00	0.59	429	0.355	0.300	0.190	0
6282	5.76	54.10	2.76	896	5.512	10.437	18.649	4
6283	7.00	56.20	NA	763	4.460	9.480	16.170	0
6285	9.00	57.20	NA	884	4.890	8.170	13.420	0
6291	9.10	79.20	2.21	250	0.750	1.360	1.220	0
6302	7.80	62.40	NA	708	4.900	15.090	3.540	3
6332	9.51	50.22	26.92	9	11.745	NA	NA	0
6351	0.08	87.97	68.18	23	0.000	0.000	0.000	0
7507	10.87	74.00	0.91	7	0.640	0.992	2.476	NA
7508	0.46	74.64	39.15	8	5.096	0.753	0.238	0
7509	24.29	47.24	32.86	462	4.728	NA	NA	4
7511	22.35	52.47	22.67	333	4.847	NA	NA	4
7512	5.88	64.69	44.29	268	10.411	NA	NA	0
7513	22.50	54.30	26.26	318	4.481	NA	NA	NA
7514	3.78	73.01	37.81	341	6.802	NA	NA	4
7515	7.72	51.68	27.03	260	4.326	NA	NA	2
7516	2.94	56.82	8.82	35	2.941	9.155	12.224	0
7517	7.95	67.26	7.20	423	2.166	11.501	6.513	0
7518	7.50	55.16	0.55	764	7.216	21.143	2.392	0
7519	25.00	50.50	28.75	238	6.250	2.645	2.892	6
7520	21.91	50.30	28.71	383	4.753	3.920	1.917	4
7522	6.21	57.87	33.40	260	3.870	NA	NA	2
7525	8.68	65.49	8.82	467	2.469	12.698	6.513	0
7526	8.08	64.70	7.05	705	2.892	12.557	6.631	0
7528	26.50	53.15	1.80	842	1.102	1.661	4.018	0
7530	2.28	63.84	0.92	202	8.337	5.632	11.739	0
7532	4.13	57.97	9.75	246	1.887	15.409	6.930	0
7534	16.67	63.42	42.31	321	3.227	2.558	1.228	6

7535	18.57	53.26	17.14	293	1.213	9.486	4.181	0
7536	17.88	59.58	27.30	486	4.687	2.498	1.268	0
7537	5.55	69.40	20.80	312	5.008	5.303	1.440	0
7538	7.17	66.27	30.00	167	9.888	3.194	2.546	0
7539	11.79	68.26	4.76	854	1.342	10.842	2.130	0
7540	8.60	60.13	34.00	486	5.668	9.491	3.643	0
7541	6.67	75.47	31.54	367	1.299	1.531	2.559	36
7542	5.32	60.43	4.04	357	1.762	14.566	6.602	0
7543	15.00	62.78	20.00	400	1.436	7.932	5.006	0
7544	0.00	86.90	65.00	75	1.389	0.983	3.886	3
7546	12.34	66.36	6.02	233	6.835	6.050	2.085	0
7547	9.38	66.72	32.45	195	1.930	5.705	2.581	0
7548	1.34	69.23	3.36	296	8.689	7.443	6.912	NA
7550	4.17	79.17	29.17	313	2.083	2.945	1.929	0
7556	7.05	70.07	38.80	494	8.611	3.293	2.820	0
7559	6.72	53.54	0.34	187	5.490	14.938	12.416	0
7680	6.50	66.00	14.00	890	3.500	7.700	8.800	NA
7681	6.00	65.00	9.50	1106	3.700	8.000	9.200	NA
7861	9.00	66.70	2.20	1107	3.200	3.800	7.300	0
7862	8.55	65.70	2.15	952	4.900	4.700	9.400	5
7904	3.71	69.37	33.42	483	5.570	3.517	3.034	93
7905	3.71	72.49	29.71	316	3.713	3.375	2.994	93
8246	10.16	56.89	47.15	213	18.485	4.448	0.542	7
8259	7.30	56.00	53.00	266	4.962	14.319	12.521	6
8269	3.20	71.22	57.81	168	11.474	4.639	0.514	10
8273	7.53	60.50	49.22	45	9.435	11.290	3.753	8
8283	9.00	58.10	0.54	3	5.050	8.290	13.520	0
8296	6.40	76.68	28.00	214	1.646	3.130	3.638	0
8387	7.79	65.32	1.00	15	2.458	9.520	9.956	0
8413	6.60	57.40	1.41	15	4.344	9.040	17.093	0
8436	8.70	73.40	0.53	564	2.837	6.341	5.024	0

```
snacks_q1 <- sum(is.na(snacks$sugar))
snacks_q1
```

```
[1] 11
```

```
snacks_q2 <- sum(snacks$protein > snacks$sugar, na.rm = TRUE)
snacks_q2
```

```
[1] 35
```

```
snacks_q3 <- mean(snacks$sodium[ snacks$calories > 500], na.rm = TRUE)
snacks_q3
```

```
[1] 307.9706
```

```
snacks_q4 <- mean(snacks$sodium[ snacks$calories < 300], na.rm = TRUE)
snacks_q4
```

```
[1] 491.5
```

```
snacks_q5 <- sum(snacks$carbohydrates <= 40 | snacks$calories>=350, na.rm = TRUE)
snacks_q5
```

```
[1] 114
```

```
snacks_q6 <- sum(snacks$calories<400 & snacks$sugar<20 & snacks$protein >=12, na.rm = TRUE)
snacks_q6
```

```
[1] 1
```