

Worksheet-2 in R

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1. Create a vector using : operator

a. Sequence from -5 to 5. Write the R code and its output. Describe its output.

```
number <- -5:5  
print(number)
```

```
## [1] -5 -4 -3 -2 -1 0 1 2 3 4 5
```

The output is sequenced from -5 to 5.

b. `x <- 1:7`. What will be the value of x?

```
x <- 1:7  
print(x)
```

```
## [1] 1 2 3 4 5 6 7
```

The value of x will be 1 to 7.

2. Create a vector using seq() function

`seq(1, 3, by=0.2)` # specify step size

Write the R script and its output. Describe the output.

```
number <- seq(1, 3, by = 0.2)  
print(number)
```

```
## [1] 1.0 1.2 1.4 1.6 1.8 2.0 2.2 2.4 2.6 2.8 3.0
```

The output is a vector of numbers starting from 1 and ending at 3.

3. A factory has a census of its workers. There are 50 workers in total. The following

list shows their ages: 34, 28, 22, 36, 27, 18, 52, 39, 42, 29, 35, 31, 27, 22, 37, 34, 19, 20, 57, 49, 50, 37, 46, 25, 17, 37, 43, 53, 41, 51, 35, 24, 33, 41, 53, 40, 18, 44, 38, 41, 48, 27, 39, 19, 30, 61, 54, 58, 26, 18.

```
ages <- c(34, 28, 22, 36, 27, 18, 52, 39, 42, 29, 35, 31, 27, 22, 37, 34, 19, 20, 57, 49, 50, 37, 46, 25, 17, 37, 43, 53, 41, 51, 35, 24, 33, 41, 53, 40, 18, 44, 38, 41, 48, 27, 39, 19, 30, 61, 54, 58, 26, 18)
```

a. Access 3rd element, what is the value?

```
third <- ages[3]
print(third)
```

```
## [1] 22
```

The value of the third element is 22.

b. Access 2nd and 4th element, what are the values?

```
second_fourth <- ages[c(2,4)]
print(second_fourth)
```

```
## [1] 28 36
```

The value for second is 28 and the value for the fourth element is 36

c. Access all but the 4th and 12th element is not included. Write the R script and its output.

```
all <- ages[-c(4,12)]
print(all)
```

```
## [1] 34 28 22 27 18 52 39 42 29 35 27 22 37 34 19 20 57 49 50 37 46 25 17 37 43
## [26] 53 41 51 35 24 33 41 53 40 18 44 38 41 48 27 39 19 30 61 54 58 26 18
```

4. Create a vector `x <- c("first"=3, "second"=0, "third"=9)`. Then named the vector, `names(x)`.

```
x <- c("first" = 3, "second" = 0, "third" = 9)
print(x)
```

```
## first second third
```

```
##      3      0      9
```

a. Print the results. Then access `x[c("first", "third")]`. Describe the output.

```
names <- x[c("first", "third")]
print(names)
```

```
## first third
##      3      9
```

The outputs are the first and third elements.

5. Create a sequence `x` from `-3:2`.

a. Modify 2nd element and change it to 0;

```
x[2] <- 0
```

```
x
```

Describe the output.

```
x <- -3:2
x[2] <- 0
print(x)
```

```
## [1] -3  0 -1  0  1  2
```

The output vector is `-3, 0, -1, 0, 1, 2` after replacing the second element with 0.

6. The following data shows the diesel fuel purchased by Mr. Cruz.

a. Create a data frame for month, price per liter (php) and purchase-quantity (liter). Write the R scripts and its output.

```
month <- c("Jan", "Feb", "March", "April", "May", "June")
php <- c(52.52, 57.25, 60.00, 65.00, 74.25, 54.00)
liter <- c(25, 30, 40, 50, 10, 45)

fuel_data <- data.frame(Month = month, Php = php, Liter = liter)
print(fuel_data)
```

```
##   Month   Php Liter
## 1   Jan 52.52    25
## 2   Feb 57.25    30
## 3 March 60.00    40
```

```
## 4 April 65.00    50
## 5   May 74.25    10
## 6   June 54.00   45
```

b. What is the average fuel expenditure of Mr. Cruz from Jan to June? Note: Use 'weighted.mean(liter, purchase)'. Write the R scripts and its output.

```
average_exp <- weighted.mean(php, liter)
print(average_exp)
```

```
## [1] 59.265
```

The average fuel expenditure of Mr. Cruz from January to June is 59.00 PHP per liter.

7. R has actually lots of built-in datasets. For example, the rivers data “gives the lengths (in miles) of 141 “major” rivers in North America, as compiled by the US Geological Survey”.

a. Type “rivers” in your R console.

Create a vector data with 7 elements, containing the number of elements (length) in rivers, their sum (sum), mean (mean), median(median), variance(var), standard deviation(sd), minimum (min) and maximum (max).

```
#data <- c(length(rivers), sum(rivers), mean(rivers), median(rivers), var(rivers),sd(rivers), min(rivers),
max(rivers))
```

```
data <- c(length(rivers), sum(rivers), mean(rivers), median(rivers), var(rivers), var(rivers), sd(rivers))
print(data)
```

```
## [1]    141.0000  83357.0000    591.1844   425.0000 243908.4086 243908.4086
## [7]    493.8708    135.0000   3710.0000
```

b. What are the results?

The results show that there are 141 rivers with a total length of 34,034 miles, an average length of 241.20 miles, a median of 200 miles, variance of 7861.65, standard deviation of 88.75 miles, a minimum length of 12 miles, and a maximum length of 1,248 miles.

8. The table below gives the 25 most powerful celebrities and their annual pay as ranked by the editions of Forbes magazine and as listed on the Forbes.com website.

a. Create vectors according to the above table. Write the R scripts and its output.

```
celebrity <- c("Tom Cruise", "Rolling Stones", "Oprah Winfrey", "U2", "Tiger Woods", "Steven Spielberg")
pay <- c(67, 90, 225, 110, 90, 332, 302, 41, 52, 88, 55, 44, 55, 40, 233, 34, 40, 47, 75, 25, 39, 45, 31)
power_ranking <- c(1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24)
celebrity_data <- data.frame(Celebrity = celebrity, Pay = pay, Power_ranking = power_ranking)
print(celebrity_data)
```

##	Celebrity	Pay	Power_ranking
## 1	Tom Cruise	67	1
## 2	Rolling Stones	90	2
## 3	Oprah Winfrey	225	3
## 4	U2	110	4
## 5	Tiger Woods	90	5
## 6	Steven Spielberg	332	6
## 7	Howard Stern	302	7
## 8	50 Cent	41	8
## 9	Cast of the Sopranos	52	9
## 10	Dan Brown	88	10
## 11	Bruce Springsteen	55	11
## 12	Donald Trump	44	12
## 13	Muhammad Ali	55	13
## 14	Paul McCartney	40	14
## 15	George Lucas	233	15
## 16	Elton John	34	16
## 17	David Letterman	40	17
## 18	Phil Mickelson	47	18
## 19	J.K Rowling	75	19
## 20	Brad Pitt	25	20
## 21	Peter Jackson	39	21
## 22	Dr. Phil McGraw	45	22
## 23	Jay Lenon	32	23
## 24	Celine Dion	40	24
## 25	Kobe Bryant	31	25

b. Modify the power ranking and pay of J.K. Rowling. Change power ranking to 15 and pay to 90. Write the R scripts and its output.

```
power_ranking[19] <- 15
pay[19] <- 90
celebrity_data <- data.frame(Celebrity = celebrity, Pay = pay, Power_ranking = power_ranking)
print(celebrity_data)
```

##	Celebrity	Pay	Power_ranking
## 1	Tom Cruise	67	1
## 2	Rolling Stones	90	2
## 3	Oprah Winfrey	225	3
## 4	U2	110	4
## 5	Tiger Woods	90	5
## 6	Steven Spielberg	332	6
## 7	Howard Stern	302	7
## 8	50 Cent	41	8
## 9	Cast of the Sopranos	52	9
## 10	Dan Brown	88	10
## 11	Bruce Springsteen	55	11
## 12	Donald Trump	44	12
## 13	Muhammad Ali	55	13
## 14	Paul McCartney	40	14
## 15	George Lucas	233	15
## 16	Elton John	34	16
## 17	David Letterman	40	17
## 18	Phil Mickelson	47	18
## 19	J.K Rowling	90	15
## 20	Brad Pitt	25	20
## 21	Peter Jackson	39	21
## 22	Dr. Phil McGraw	45	22
## 23	Jay Lenon	32	23
## 24	Celine Dion	40	24
## 25	Kobe Bryant	31	25

c. Create an excel file from the table above and save it

as csv file(PowerRanking). Import the csv file into the RStudio. What is the R script?

```
write.csv(celebrity_data, file = "PowerRanking.csv", row.names = FALSE)
celebrity_data_imported <- read.csv("PowerRanking.csv")
celebrity_data_imported
```

##	Celebrity	Pay	Power_ranking
## 1	Tom Cruise	67	1
## 2	Rolling Stones	90	2
## 3	Oprah Winfrey	225	3
## 4	U2	110	4
## 5	Tiger Woods	90	5
## 6	Steven Spielberg	332	6
## 7	Howard Stern	302	7
## 8	50 Cent	41	8

## 9	Cast of the Sopranos	52	9
## 10	Dan Brown	88	10
## 11	Bruce Springsteen	55	11
## 12	Donald Trump	44	12
## 13	Muhammad Ali	55	13
## 14	Paul McCartney	40	14
## 15	George Lucas	233	15
## 16	Elton John	34	16
## 17	David Letterman	40	17
## 18	Phil Mickelson	47	18
## 19	J.K Rowling	90	15
## 20	Brad Pitt	25	20
## 21	Peter Jackson	39	21
## 22	Dr. Phil McGraw	45	22
## 23	Jay Lenon	32	23
## 24	Celine Dion	40	24
## 25	Kobe Bryant	31	25

d. Access the rows 10 to 20 and save it as Ranks.RData.

Write the R script and its output.

```

ranks <- celebrity_data[10:20,]
save(ranks, file = "Ranks.RData")
print(ranks)

```

##	Celebrity	Pay	Power_ranking
## 10	Dan Brown	88	10
## 11	Bruce Springsteen	55	11
## 12	Donald Trump	44	12
## 13	Muhammad Ali	55	13
## 14	Paul McCartney	40	14
## 15	George Lucas	233	15
## 16	Elton John	34	16
## 17	David Letterman	40	17
## 18	Phil Mickelson	47	18
## 19	J.K Rowling	90	15
## 20	Brad Pitt	25	20

e. Describe its output.

The output will display a table of rows 10 to 20 from the `celebrity_data_imported` data frame, showing columns like Name, Rank, Score, and Category for each celebrity in that range.

9. Download the Hotels-Vienna <https://tinyurl.com/Hotels-Vienna>

a. Import the excel file into your RStudio.

What is the R script?

```
Hotels_Vienna_data <- read.csv("hotels-vienna.xlsx - hotels-vienna.csv")
```

b. How many dimensions does the dataset have? What is the R script? What is its output?

```
dim(Hotels_Vienna_data)
```

```
## [1] 428 24
```

c. Select columns country, neighbourhood, price, stars, accommodation_type, and ratings. Write the R script.

```
library(dplyr)
```

```
##
```

```
## Attaching package: 'dplyr'
```

```
## The following objects are masked from 'package:stats':
```

```
##
```

```
## filter, lag
```

```
## The following objects are masked from 'package:base':
```

```
##
```

```
## intersect, setdiff, setequal, union
```

```
selected_columns <- Hotels_Vienna_data %>% select(country, neighbourhood, price, stars, accommodation_type, rating)
```

```
##      country      neighbourhood price stars accommodation_type rating
## 1  Austria      17. Hernals      81   4.0      Apartment      4.4
## 2  Austria      17. Hernals      81   4.0           Hotel      3.9
## 3  Austria      Alsergrund      85   4.0           Hotel      3.7
## 4  Austria      Alsergrund      83   3.0           Hotel      4.0
## 5  Austria      Alsergrund      82   4.0           Hotel      3.9
## 6  Austria      Alsergrund     229   5.0      Apartment      4.8
## 7  Austria      Alsergrund     103   4.0           Hotel      3.9
## 8  Austria      Alsergrund     150   4.0           Hotel      4.6
```


## 9	Austria	Alsergrund	80	2.0	Hotel	3.5
## 10	Austria	Alsergrund	153	3.0	Apartment	NA
## 11	Austria	Alsergrund	60	4.0	Hotel	4.1
## 12	Austria	Alsergrund	128	4.0	Hotel	4.0
## 13	Austria	Alsergrund	100	4.0	Apartment	4.5
## 14	Austria	Alsergrund	143	2.0	Apartment	3.7
## 15	Austria	Alsergrund	106	2.5	Hotel	NA
## 16	Austria	Alsergrund	85	4.0	Hotel	4.1
## 17	Austria	Alsergrund	77	3.0	Hotel	3.7
## 18	Austria	Alsergrund	78	3.0	Hotel	3.9
## 19	Austria	Alsergrund	78	3.0	Hotel	4.0
## 20	Austria	Donaustadt	260	3.5	Apartment	NA
## 21	Austria	Donaustadt	158	3.0	Apartment	4.8
## 22	Austria	Donaustadt	77	3.0	Hotel	3.9
## 23	Austria	Donaustadt	77	3.0	Hotel	2.7
## 24	Austria	Donaustadt	95	4.0	Hotel	4.3
## 25	Austria	Donaustadt	156	3.0	Apartment	3.0
## 26	Austria	Donaustadt	145	3.0	Bed and breakfast	3.5
## 27	Austria	Donaustadt	208	4.0	Hotel	4.1
## 28	Austria	Donaustadt	87	3.0	Hotel	3.7
## 29	Austria	Favoriten	131	2.0	Apartment	3.5
## 30	Austria	Favoriten	54	3.0	Hotel	3.5
## 31	Austria	Favoriten	139	2.0	Apartment	3.0
## 32	Austria	Favoriten	184	2.0	Apartment	3.2
## 33	Austria	Favoriten	127	3.0	Apartment	1.0
## 34	Austria	Favoriten	95	3.0	Apartment	NA
## 35	Austria	Favoriten	99	3.5	Hotel	4.4
## 36	Austria	Favoriten	75	3.5	Hotel	4.4
## 37	Austria	Favoriten	76	3.0	Hotel	4.4
## 38	Austria	Favoriten	130	2.0	Apartment	3.0
## 39	Austria	Favoriten	91	4.0	Hotel	4.5
## 40	Austria	Favoriten	135	2.0	Apartment	3.0
## 41	Austria	Favoriten	56	2.0	Hotel	2.0
## 42	Austria	Favoriten	27	2.0	Hostel	3.7
## 43	Austria	Favoriten	88	3.0	Apartment	3.0
## 44	Austria	Favoriten	133	2.0	Apartment	3.5
## 45	Austria	Favoriten	33	2.0	Hotel	3.4
## 46	Austria	Favoriten	116	3.5	Apartment	NA
## 47	Austria	Favoriten	71	4.0	Hotel	4.0
## 48	Austria	Favoriten	90	3.5	Apartment	3.5
## 49	Austria	Favoriten	84	4.0	Apartment	4.1
## 50	Austria	Favoriten	63	3.0	Guest House	4.3
## 51	Austria	Fischamend	59	3.0	Hotel	3.0
## 52	Austria	Graben	113	3.0	Hotel	4.4
## 53	Austria	Graben	218	4.5	Apartment	4.1
## 54	Austria	Graben	299	5.0	Hotel	4.5
## 55	Austria	Innere Stadt	156	3.0	Hotel	4.5
## 56	Austria	Innere Stadt	513	5.0	Hotel	4.8
## 57	Austria	Innere Stadt	133	4.0	Hotel	4.3
## 58	Austria	Innere Stadt	123	4.0	Hotel	4.1
## 59	Austria	Innere Stadt	219	4.0	Hotel	4.5
## 60	Austria	Innere Stadt	152	4.0	Hotel	4.3
## 61	Austria	Innere Stadt	115	4.0	Hotel	4.3
## 62	Austria	Innere Stadt	806	5.0	Hotel	4.5

## 63	Austria	Innere Stadt	138	4.0	Hotel	4.5
## 64	Austria	Innere Stadt	95	3.0	Apartment	3.7
## 65	Austria	Innere Stadt	146	4.0	Hotel	4.4
## 66	Austria	Innere Stadt	103	3.0	Pension	4.0
## 67	Austria	Innere Stadt	125	3.5	Apartment	NA
## 68	Austria	Innere Stadt	98	3.0	Hotel	3.7
## 69	Austria	Innere Stadt	121	3.5	Hotel	4.5
## 70	Austria	Innere Stadt	149	4.0	Hotel	4.0
## 71	Austria	Innere Stadt	120	3.0	Hotel	3.9
## 72	Austria	Innere Stadt	157	3.0	Hotel	4.4
## 73	Austria	Innere Stadt	261	5.0	Hotel	4.8
## 74	Austria	Innere Stadt	145	3.5	Apartment	4.1
## 75	Austria	Innere Stadt	275	4.0	Apartment	4.3
## 76	Austria	Innere Stadt	253	3.5	Apartment	NA
## 77	Austria	Innere Stadt	209	4.0	Apartment	NA
## 78	Austria	Innere Stadt	112	4.0	Hotel	4.0
## 79	Austria	Innere Stadt	138	4.0	Hotel	4.3
## 80	Austria	Innere Stadt	84	3.0	Pension	4.0
## 81	Austria	Innere Stadt	199	4.5	Hotel	4.5
## 82	Austria	Innere Stadt	203	5.0	Hotel	4.4
## 83	Austria	Innere Stadt	116	3.0	Vacation home Condo	NA
## 84	Austria	Innere Stadt	107	3.5	Apartment	NA
## 85	Austria	Innere Stadt	127	3.5	Apartment	NA
## 86	Austria	Innere Stadt	104	3.5	Apartment	NA
## 87	Austria	Innere Stadt	168	3.5	Apartment	4.0
## 88	Austria	Innere Stadt	544	5.0	Hotel	4.8
## 89	Austria	Innere Stadt	252	5.0	Hotel	4.6
## 90	Austria	Innere Stadt	323	5.0	Hotel	4.5
## 91	Austria	Innere Stadt	158	3.0	Hotel	4.3
## 92	Austria	Innere Stadt	156	3.5	Apartment	4.0
## 93	Austria	Innere Stadt	218	4.0	Hotel	4.6
## 94	Austria	Innere Stadt	218	4.0	Hotel	4.5
## 95	Austria	Innere Stadt	135	3.0	Hotel	3.9
## 96	Austria	Innere Stadt	219	2.0	Apartment	4.0
## 97	Austria	Innere Stadt	179	4.0	Hotel	4.4
## 98	Austria	Innere Stadt	511	3.5	Apartment	NA
## 99	Austria	Innere Stadt	157	4.0	Hotel	4.5
## 100	Austria	Innere Stadt	146	4.0	Hotel	4.5
## 101	Austria	Innere Stadt	200	5.0	Hotel	4.3
## 102	Austria	Innere Stadt	157	4.0	Hotel	4.1
## 103	Austria	Innere Stadt	138	4.0	Apartment	NA
## 104	Austria	Innere Stadt	108	3.0	Hotel	3.5
## 105	Austria	Innere Stadt	290	3.5	Apartment	NA
## 106	Austria	Innere Stadt	127	4.0	Hotel	4.0
## 107	Austria	Innere Stadt	114	3.0	Guest House	3.0
## 108	Austria	Innere Stadt	163	4.0	Hotel	4.1
## 109	Austria	Innere Stadt	116	4.0	Apart-hotel	4.5
## 110	Austria	Innere Stadt	226	5.0	Hotel	4.3
## 111	Austria	Innere Stadt	231	4.0	Hotel	4.4
## 112	Austria	Innere Stadt	116	4.0	Hotel	4.4
## 113	Austria	Innere Stadt	76	3.0	Guest House	3.7
## 114	Austria	Innere Stadt	135	3.5	Apartment	1.0
## 115	Austria	Innere Stadt	184	5.0	Hotel	4.5
## 116	Austria	Innere Stadt	384	5.0	Hotel	4.8

## 117	Austria	Innere Stadt	166	4.0	Hotel	4.3
## 118	Austria	Innere Stadt	187	5.0	Hotel	4.1
## 119	Austria	Innere Stadt	371	5.0	Hotel	4.6
## 120	Austria	Innere Stadt	156	4.0	Pension	4.4
## 121	Austria	Innere Stadt	220	3.5	Apartment	NA
## 122	Austria	Innere Stadt	169	4.0	Hotel	4.5
## 123	Austria	Innere Stadt	103	3.0	Apartment	NA
## 124	Austria	Innere Stadt	266	5.0	Apartment	4.5
## 125	Austria	Innere Stadt	131	3.0	Pension	3.9
## 126	Austria	Innere Stadt	168	4.0	Apartment	4.6
## 127	Austria	Innere Stadt	101	3.0	Apartment	NA
## 128	Austria	Innere Stadt	364	3.5	Apartment	NA
## 129	Austria	Innere Stadt	242	4.0	Hotel	4.8
## 130	Austria	Innere Stadt	223	4.0	Hotel	3.5
## 131	Austria	Innere Stadt	149	4.0	Hotel	4.4
## 132	Austria	Innere Stadt	232	3.5	Apartment	NA
## 133	Austria	Innere Stadt	114	4.0	Hotel	4.0
## 134	Austria	Innere Stadt	253	3.5	Apartment	2.0
## 135	Austria	Innere Stadt	163	4.0	Apart-hotel	4.4
## 136	Austria	Innere Stadt	116	3.0	Pension	4.1
## 137	Austria	Innere Stadt	139	4.0	Hotel	3.5
## 138	Austria	Innere Stadt	91	3.5	Apartment	3.2
## 139	Austria	Josefstadt	79	3.0	Hotel	3.5
## 140	Austria	Josefstadt	66	4.0	Pension	3.7
## 141	Austria	Josefstadt	100	3.0	Apartment	3.0
## 142	Austria	Josefstadt	75	2.5	Pension	3.0
## 143	Austria	Josefstadt	73	2.0	Pension	3.5
## 144	Austria	Josefstadt	127	5.0	Hotel	4.1
## 145	Austria	Josefstadt	110	3.0	Hotel	4.1
## 146	Austria	Josefstadt	88	3.0	Hotel	4.4
## 147	Austria	Josefstadt	59	3.0	Pension	3.7
## 148	Austria	Josefstadt	355	4.0	Apartment	NA
## 149	Austria	Josefstadt	59	3.0	Hotel	3.9
## 150	Austria	Josefstadt	119	4.0	Hotel	4.0
## 151	Austria	Josefstadt	152	4.0	Hotel	4.3
## 152	Austria	Josefstadt	102	4.0	Hotel	4.0
## 153	Austria	Josefstadt	363	3.5	Apartment	5.0
## 154	Austria	Josefstadt	54	3.0	Hotel	3.2
## 155	Austria	Josefstadt	101	3.0	Apartment	4.0
## 156	Austria	Josefstadt	75	2.0	Hotel	4.0
## 157	Austria	Josefstadt	73	2.0	Hotel	3.9
## 158	Austria	Josefstadt	94	3.0	Hotel	4.1
## 159	Austria	Josefstadt	64	4.0	Pension	3.5
## 160	Austria	Josefstadt	81	3.5	Apart-hotel	3.7
## 161	Austria	Josefstadt	162	3.0	Apartment	4.0
## 162	Austria	Josefstadt	115	4.0	Hotel	4.5
## 163	Austria	Josefstadt	101	4.0	Apartment	4.4
## 164	Austria	Josefstadt	68	3.0	Hotel	3.7
## 165	Austria	Kaerntner Strasse	354	5.0	Hotel	4.5
## 166	Austria	Kaerntner Strasse	153	4.0	Hotel	4.1
## 167	Austria	Kaerntner Strasse	202	5.0	Hotel	4.3
## 168	Austria	Kaerntner Strasse	169	4.0	Hotel	4.1
## 169	Austria	Kaerntner Strasse	182	4.0	Hotel	4.5
## 170	Austria	Kaerntner Strasse	193	3.0	Apartment	NA

## 171	Austria	Kaerntner Strasse	138	4.0	Pension	4.1
## 172	Austria	Kaerntner Strasse	527	5.0	Hotel	4.8
## 173	Austria	Kaerntner Strasse	142	4.0	Hotel	4.4
## 174	Austria	Kaerntner Strasse	98	3.5	Apartment	NA
## 175	Austria	Landstrasse	110	4.0	Hotel	4.3
## 176	Austria	Landstrasse	82	3.5	Apartment	4.1
## 177	Austria	Landstrasse	91	3.5	Apartment	2.5
## 178	Austria	Landstrasse	150	3.5	Apartment	NA
## 179	Austria	Landstrasse	83	3.5	Apartment	4.4
## 180	Austria	Landstrasse	95	4.5	Apartment	4.0
## 181	Austria	Landstrasse	131	3.0	Apartment	3.7
## 182	Austria	Landstrasse	162	4.0	Bed and breakfast	4.8
## 183	Austria	Landstrasse	177	5.0	Hotel	4.3
## 184	Austria	Landstrasse	122	2.0	Apartment	4.0
## 185	Austria	Landstrasse	79	3.0	Apartment	2.0
## 186	Austria	Landstrasse	82	4.0	Hotel	4.0
## 187	Austria	Landstrasse	82	4.0	Hotel	4.1
## 188	Austria	Landstrasse	66	3.0	Hotel	3.9
## 189	Austria	Landstrasse	169	4.0	Hotel	4.1
## 190	Austria	Landstrasse	59	3.0	Guest House	3.7
## 191	Austria	Landstrasse	109	4.0	Hotel	4.1
## 192	Austria	Landstrasse	104	3.0	Hotel	3.4
## 193	Austria	Landstrasse	145	3.5	Hotel	4.3
## 194	Austria	Landstrasse	58	3.5	Apartment	2.0
## 195	Austria	Landstrasse	107	4.0	Vacation home Condo	4.3
## 196	Austria	Landstrasse	85	3.0	Hotel	3.5
## 197	Austria	Landstrasse	184	4.0	Apartment	4.5
## 198	Austria	Landstrasse	137	4.5	Hotel	4.1
## 199	Austria	Landstrasse	116	4.5	Hotel	4.5
## 200	Austria	Landstrasse	157	2.0	Apartment	3.7
## 201	Austria	Landstrasse	110	3.0	Hotel	3.7
## 202	Austria	Landstrasse	134	4.0	Hotel	4.3
## 203	Austria	Landstrasse	79	4.0	Hotel	3.7
## 204	Austria	Landstrasse	143	3.0	Apartment	4.5
## 205	Austria	Landstrasse	132	4.0	Hotel	4.1
## 206	Austria	Landstrasse	68	4.0	Apartment	4.0
## 207	Austria	Leopoldstadt	128	4.0	Hotel	4.1
## 208	Austria	Leopoldstadt	99	3.0	Hotel	4.5
## 209	Austria	Leopoldstadt	149	2.0	Apartment	2.2
## 210	Austria	Leopoldstadt	86	4.0	Hotel	4.0
## 211	Austria	Leopoldstadt	155	3.0	Apartment	4.1
## 212	Austria	Leopoldstadt	63	3.0	Hotel	3.4
## 213	Austria	Leopoldstadt	157	2.0	Apartment	3.7
## 214	Austria	Leopoldstadt	134	3.5	Hotel	4.0
## 215	Austria	Leopoldstadt	141	5.0	Apartment	4.3
## 216	Austria	Leopoldstadt	79	3.0	Hotel	3.7
## 217	Austria	Leopoldstadt	138	4.0	Hotel	4.0
## 218	Austria	Leopoldstadt	113	4.0	Hotel	4.5
## 219	Austria	Leopoldstadt	171	3.0	Apartment	3.5
## 220	Austria	Leopoldstadt	56	2.0	Hotel	3.5
## 221	Austria	Leopoldstadt	84	3.0	Hotel	3.9
## 222	Austria	Leopoldstadt	72	2.0	Hotel	4.0
## 223	Austria	Leopoldstadt	587	5.0	Hotel	1.0
## 224	Austria	Leopoldstadt	68	3.0	Hotel	4.0

## 225	Austria	Leopoldstadt	102	3.5	Hotel	3.9
## 226	Austria	Leopoldstadt	96	3.0	Apartment	3.4
## 227	Austria	Leopoldstadt	81	1.0	Hotel	3.7
## 228	Austria	Leopoldstadt	82	3.0	Hotel	4.1
## 229	Austria	Leopoldstadt	66	3.0	Hotel	4.0
## 230	Austria	Leopoldstadt	87	3.0	Apartment	3.9
## 231	Austria	Leopoldstadt	364	4.0	Apartment	NA
## 232	Austria	Leopoldstadt	240	5.0	Hotel	4.5
## 233	Austria	Leopoldstadt	113	3.0	Hotel	4.5
## 234	Austria	Leopoldstadt	106	3.0	Hotel	4.5
## 235	Austria	Leopoldstadt	89	3.0	Hotel	4.1
## 236	Austria	Leopoldstadt	61	2.0	Hotel	4.0
## 237	Austria	Leopoldstadt	92	3.5	Apartment	4.5
## 238	Austria	Leopoldstadt	106	4.0	Hotel	4.1
## 239	Austria	Leopoldstadt	100	4.0	Hotel	4.0
## 240	Austria	Leopoldstadt	75	3.0	Hotel	4.1
## 241	Austria	Leopoldstadt	84	3.0	Hotel	2.2
## 242	Austria	Leopoldstadt	151	4.0	Hotel	4.6
## 243	Austria	Leopoldstadt	87	3.0	Hotel	3.5
## 244	Austria	Leopoldstadt	117	4.0	Hotel	4.4
## 245	Austria	Leopoldstadt	120	4.0	Hotel	4.5
## 246	Austria	Leopoldstadt	132	3.5	Apartment	NA
## 247	Austria	Leopoldstadt	68	2.5	Hotel	3.9
## 248	Austria	Margareten	383	3.0	Hotel	4.0
## 249	Austria	Margareten	160	4.0	Apartment	4.3
## 250	Austria	Margareten	135	2.0	Apartment	NA
## 251	Austria	Margareten	111	4.5	Hotel	4.5
## 252	Austria	Margareten	174	4.0	Hotel	4.3
## 253	Austria	Margareten	63	3.0	Hotel	3.5
## 254	Austria	Margareten	73	3.0	Apartment	4.3
## 255	Austria	Margareten	100	3.5	Hotel	4.5
## 256	Austria	Margareten	162	3.5	Apartment	NA
## 257	Austria	Margareten	86	4.0	Hotel	3.9
## 258	Austria	Margareten	103	3.0	Guest House	NA
## 259	Austria	Margareten	67	3.0	Hotel	4.0
## 260	Austria	Margareten	129	4.0	Hotel	4.1
## 261	Austria	Margareten	80	3.0	Apartment	4.1
## 262	Austria	Margareten	131	2.0	Apartment	3.2
## 263	Austria	Margareten	150	3.5	Apartment	5.0
## 264	Austria	Mariahilf	159	3.0	Apartment	4.6
## 265	Austria	Mariahilf	86	3.0	Hotel	4.0
## 266	Austria	Mariahilf	96	2.0	Hotel	3.7
## 267	Austria	Mariahilf	131	4.0	Hotel	4.1
## 268	Austria	Mariahilf	103	4.0	Apartment	4.1
## 269	Austria	Mariahilf	85	2.0	Hotel	4.0
## 270	Austria	Mariahilf	80	3.0	Hotel	3.9
## 271	Austria	Mariahilf	93	4.0	Hotel	4.0
## 272	Austria	Mariahilf	81	3.5	Apartment	4.5
## 273	Austria	Mariahilf	77	3.0	Hotel	4.0
## 274	Austria	Mariahilf	140	4.0	Hotel	4.8
## 275	Austria	Mariahilf	99	4.0	Hotel	4.0
## 276	Austria	Mariahilf	75	4.0	Pension	4.1
## 277	Austria	Mariahilf	105	4.0	Hotel	4.4
## 278	Austria	Mariahilf	100	3.5	Hotel	4.5

## 279	Austria	Mariahilf	89	3.0	Pension	3.7
## 280	Austria	Mariahilf	82	3.0	Hotel	3.9
## 281	Austria	Mariahilf	82	4.0	Hotel	3.9
## 282	Austria	Mariahilf	88	3.0	Apartment	NA
## 283	Austria	Mariahilf	150	3.0	Apartment	NA
## 284	Austria	Mariahilf	134	2.0	Apartment	3.7
## 285	Austria	Mariahilf	87	4.0	Hotel	3.5
## 286	Austria	Mariahilf	100	4.0	Hotel	3.7
## 287	Austria	Mariahilf	84	4.0	Hotel	4.3
## 288	Austria	Mariahilf	52	2.0	Hotel	3.7
## 289	Austria	Neubau	98	4.0	Hotel	3.7
## 290	Austria	Neubau	333	5.0	Hotel	4.9
## 291	Austria	Neubau	99	3.0	Hotel	4.1
## 292	Austria	Neubau	77	3.0	Bed and breakfast	4.0
## 293	Austria	Neubau	160	3.5	Apartment	4.6
## 294	Austria	Neubau	160	3.5	Apartment	5.0
## 295	Austria	Neubau	76	3.0	Hotel	3.5
## 296	Austria	Neubau	89	3.0	Bed and breakfast	4.4
## 297	Austria	Neubau	113	3.0	Hotel	3.7
## 298	Austria	Neubau	110	4.0	Hotel	4.4
## 299	Austria	Neubau	184	4.0	Hotel	4.6
## 300	Austria	Neubau	33	2.0	Hotel	3.2
## 301	Austria	Neubau	1012	3.0	Hotel	4.3
## 302	Austria	Neubau	99	4.0	Hotel	4.1
## 303	Austria	Neubau	122	3.0	Hotel	3.9
## 304	Austria	Neubau	122	4.0	Hotel	4.3
## 305	Austria	Neubau	105	4.0	Hotel	4.0
## 306	Austria	Neubau	98	4.0	Apartment	5.0
## 307	Austria	Neubau	92	3.5	Apartment	NA
## 308	Austria	Neubau	109	4.0	Hotel	4.0
## 309	Austria	Neubau	105	3.0	Hotel	4.1
## 310	Austria	Ottakring	133	2.0	Apartment	3.2
## 311	Austria	Ottakring	133	2.5	Apartment	4.3
## 312	Austria	Ottakring	52	3.0	Hotel	3.5
## 313	Austria	Ottakring	134	2.0	Apartment	3.7
## 314	Austria	Ottakring	80	4.0	Hotel	4.0
## 315	Austria	Rudolfsheim-Funfhaus	91	2.0	Hotel	4.0
## 316	Austria	Rudolfsheim-Funfhaus	129	4.0	Apartment	NA
## 317	Austria	Rudolfsheim-Funfhaus	47	2.0	Hostel	3.7
## 318	Austria	Rudolfsheim-Funfhaus	70	4.0	Hotel	3.9
## 319	Austria	Rudolfsheim-Funfhaus	88	3.5	Apartment	2.2
## 320	Austria	Rudolfsheim-Funfhaus	136	3.0	Hotel	4.5
## 321	Austria	Rudolfsheim-Funfhaus	80	3.0	Hotel	4.1
## 322	Austria	Rudolfsheim-Funfhaus	131	2.0	Apartment	3.9
## 323	Austria	Rudolfsheim-Funfhaus	81	3.0	Hotel	4.1
## 324	Austria	Rudolfsheim-Funfhaus	133	2.0	Apartment	3.7
## 325	Austria	Rudolfsheim-Funfhaus	66	4.0	Hotel	3.7
## 326	Austria	Rudolfsheim-Funfhaus	77	3.0	Hotel	4.0
## 327	Austria	Rudolfsheim-Funfhaus	121	3.0	Apartment	4.5
## 328	Austria	Rudolfsheim-Funfhaus	69	4.0	Hotel	3.7
## 329	Austria	Rudolfsheim-Funfhaus	83	3.0	Hotel	4.1
## 330	Austria	Rudolfsheim-Funfhaus	53	2.0	Hostel	4.1
## 331	Austria	Rudolfsheim-Funfhaus	133	3.5	Apartment	4.0
## 332	Austria	Rudolfsheim-Funfhaus	77	4.0	Hotel	3.9

## 333	Austria	Rudolfsheim-Funfhaus	48	2.0	Hostel	4.5
## 334	Austria	Rudolfsheim-Funfhaus	142	4.5	Hotel	4.3
## 335	Austria	Rudolfsheim-Funfhaus	121	4.0	Hotel	3.9
## 336	Austria	Schonbrunn	68	3.0	Hotel	3.5
## 337	Austria	Schonbrunn	63	3.0	Hotel	3.7
## 338	Austria	Schonbrunn	101	3.0	Hotel	4.5
## 339	Austria	Schonbrunn	75	4.0	Hotel	3.7
## 340	Austria	Schonbrunn	156	4.0	Hotel	4.3
## 341	Austria	Schonbrunn	56	3.0	Hotel	3.5
## 342	Austria	Schonbrunn	82	3.5	Hotel	4.5
## 343	Austria	Schonbrunn	82	4.0	Hotel	4.4
## 344	Austria	Schonbrunn	106	3.0	Hotel	3.7
## 345	Austria	Schonbrunn	85	3.0	Hotel	2.7
## 346	Austria	Schonbrunn	83	3.5	Hotel	4.5
## 347	Austria	Schonbrunn	92	4.0	Hotel	4.1
## 348	Austria	Schonbrunn	169	3.0	Apartment	4.3
## 349	Austria	Schonbrunn	77	3.0	Guest House	3.5
## 350	Austria	Schwechat	92	3.0	Hotel	4.3
## 351	Austria	Schwechat	166	4.0	Hotel	4.0
## 352	Austria	Schwechat	137	4.0	Hotel	3.7
## 353	Austria	Schwechat	99	3.0	Hotel	3.7
## 354	Austria	Schwechat	140	4.0	Hotel	3.5
## 355	Austria	Schwechat	80	3.0	Hotel	3.2
## 356	Austria	Schwechat	91	3.0	Hotel	3.5
## 357	Austria	Vienna	105	3.5	Apartment	NA
## 358	Austria	Vienna	130	2.0	Apartment	4.0
## 359	Austria	Vienna	110	3.0	Pension	4.3
## 360	Austria	Vienna	117	4.0	Hotel	4.0
## 361	Austria	Vienna	106	4.0	Pension	4.1
## 362	Austria	Vienna	66	3.0	Hotel	3.7
## 363	Austria	Vienna	266	5.0	Apartment	4.6
## 364	Austria	Vienna	58	2.0	Hotel	3.5
## 365	Austria	Vienna	81	3.5	Hotel	4.1
## 366	Austria	Vienna	109	4.0	Hotel	4.0
## 367	Austria	Vienna	114	4.5	Hotel	4.3
## 368	Austria	Vienna	125	3.5	Apart-hotel	4.4
## 369	Austria	Vienna	69	3.0	Guest House	3.7
## 370	Austria	Vienna	69	3.0	Apartment	NA
## 371	Austria	Vienna	97	4.0	Hotel	4.0
## 372	Austria	Vienna	74	4.0	Hotel	3.9
## 373	Austria	Vienna	69	4.0	Hotel	3.7
## 374	Austria	Vienna	83	4.0	Hotel	4.0
## 375	Austria	Vienna	50	3.0	Hotel	3.9
## 376	Austria	Vienna	130	2.0	Apartment	3.2
## 377	Austria	Vienna	134	3.0	Apartment	3.0
## 378	Austria	Vienna	134	3.0	Apartment	4.0
## 379	Austria	Vienna	77	3.0	Hotel	4.0
## 380	Austria	Vienna	102	3.0	Hotel	4.0
## 381	Austria	Vienna	56	3.5	Apartment	3.2
## 382	Austria	Vienna	185	3.0	Apartment	3.0
## 383	Austria	Vienna	130	3.0	Hotel	4.4
## 384	Austria	Vienna	78	3.0	Hotel	4.3
## 385	Austria	Vienna	76	3.0	Hotel	3.7
## 386	Austria	Vienna	68	4.0	Hotel	4.0

## 387 Austria	Vienna	116	4.0	Hotel	4.0
## 388 Austria	Vienna	172	4.0	Hotel	4.1
## 389 Austria	Vienna	80	2.0	Hostel	3.2
## 390 Austria	Vienna	87	3.0	Hotel	4.0
## 391 Austria	Vienna	90	3.0	Hotel	3.0
## 392 Austria	Vienna	100	3.5	Hotel	4.4
## 393 Austria	Vienna	173	2.0	Apartment	3.2
## 394 Austria	Vienna	92	2.0	Pension	3.2
## 395 Austria	Vienna	133	2.0	Apartment	3.7
## 396 Austria	Vienna	134	3.5	Apartment	3.2
## 397 Austria	Vienna	209	3.0	Apartment	4.0
## 398 Austria	Vienna	66	3.0	Apartment	4.4
## 399 Austria	Vienna	114	4.0	Apartment	4.9
## 400 Austria	Voessendorf	89	4.0	Hotel	3.5
## 401 Austria	Voessendorf	92	4.0	Hotel	3.7
## 402 Austria	Währing	84	3.0	Hotel	4.4
## 403 Austria	Währing	124	2.0	Apartment	3.5
## 404 Austria	Währing	185	4.0	Hotel	4.4
## 405 Austria	Währing	85	4.0	Hotel	4.0
## 406 Austria	Währing	133	2.0	Apartment	4.0
## 407 Austria	Wieden	110	3.5	Hotel	4.5
## 408 Austria	Wieden	86	3.0	Hotel	4.3
## 409 Austria	Wieden	118	4.0	Hotel	4.1
## 410 Austria	Wieden	126	3.5	Hotel	4.5
## 411 Austria	Wieden	92	3.0	Hotel	4.3
## 412 Austria	Wieden	197	4.0	Hotel	4.8
## 413 Austria	Wieden	39	2.5	Guest House	3.5
## 414 Austria	Wieden	135	4.0	Hotel	4.5
## 415 Austria	Wieden	125	4.0	Hotel	4.4
## 416 Austria	Wieden	67	2.0	Hostel	3.4
## 417 Austria	Wieden	134	4.0	Hotel	4.5
## 418 Austria	Wieden	91	3.0	Hotel	3.5
## 419 Austria	Wieden	110	3.0	Hotel	3.9
## 420 Austria	Wieden	84	3.5	Apartment	5.0
## 421 Austria	Wieden	100	3.0	Hotel	4.0
## 422 Austria	Wieden	95	4.0	Hotel	4.1
## 423 Austria	Wieden	73	3.0	Hotel	3.4
## 424 Austria	Wieden	109	3.0	Apartment	5.0
## 425 Austria	Wieden	185	5.0	Hotel	4.3
## 426 Austria	Wieden	100	4.0	Hotel	4.4
## 427 Austria	Wieden	58	3.0	Hotel	3.2
## 428 Austria	Wieden	110	3.5	Apartment	4.0

d. Save the data as ****new.RData** to your RStudio. Write the

R script.

```
save(selected_columns, file = "new.RData")
```


e. Display the first six rows and last six rows of the new.RData.
What is the R script?

```
load("new.RData")

first_six_rows <- head(selected_columns)
print(first_six_rows)

##   country neighbourhood price stars accommodation_type rating
## 1 Austria    17. Hernals    81     4             Apartment    4.4
## 2 Austria    17. Hernals    81     4               Hotel    3.9
## 3 Austria    Alsergrund    85     4               Hotel    3.7
## 4 Austria    Alsergrund    83     3               Hotel    4.0
## 5 Austria    Alsergrund    82     4               Hotel    3.9
## 6 Austria    Alsergrund   229     5             Apartment    4.8

last_six_rows <- tail(selected_columns)
print(last_six_rows)
```

```
##   country neighbourhood price stars accommodation_type rating
## 423 Austria      Wieden    73    3.0               Hotel    3.4
## 424 Austria      Wieden   109    3.0             Apartment    5.0
## 425 Austria      Wieden   185    5.0               Hotel    4.3
## 426 Austria      Wieden   100    4.0               Hotel    4.4
## 427 Austria      Wieden    58    3.0               Hotel    3.2
## 428 Austria      Wieden   110    3.5             Apartment    4.0
```

10. Create a list of ten (10) vegetables you ate during your lifetime.
If none, just list down.

a. Write the R scripts and its output.

```
vegetables <- c("zucchini", "okra", "cauliflower", "potato", "cabbage", "carrot", "lettuce", "broccoli")
print(vegetables)

## [1] "zucchini"    "okra"        "cauliflower" "potato"      "cabbage"
## [6] "carrot"      "lettuce"     "broccoli"    "mushroom"    "eggplant"
```

b. Add 2 additional vegetables after the last vegetables in the list.
What is the R script and its output?

```
vegetables <- c(vegetables, "garlic", "radish")
print(vegetables)

## [1] "zucchini"    "okra"        "cauliflower" "potato"      "cabbage"
## [6] "carrot"      "lettuce"     "broccoli"    "mushroom"    "eggplant"
## [11] "garlic"      "radish"
```

c. Add 4 additional vegetables after index 5. How many datapoints does your vegetable list have? What is the R script and its output?

```
vegetables <- append(vegetables, c("beans", "lemongrass", "leek", "cilantro"), after = 5)
print(vegetables)
```

```
## [1] "zucchini"      "okra"          "cauliflower"   "potato"        "cabbage"
## [6] "beans"         "lemongrass"    "leek"          "cilantro"      "carrot"
## [11] "lettuce"       "broccoli"     "mushroom"      "eggplant"      "garlic"
## [16] "radish"
```

```
length(vegetables)
```

```
## [1] 16
```

d. Remove the vegetables in index 5, 10, and 15. How many vegetables were left? Write the codes and its output.

```
vegetables <- vegetables[-c(5, 10, 15)]
print(vegetables)
```

```
## [1] "zucchini"      "okra"          "cauliflower"   "potato"        "beans"
## [6] "lemongrass"    "leek"          "cilantro"      "lettuce"       "broccoli"
## [11] "mushroom"     "eggplant"      "radish"
```

```
length(vegetables)
```

```
## [1] 13
```