R

Question 1

```
# a
numvec <- c(3, 4, 5, 6, 7)
numvec
charvec <- c("u", "v", "w", "x", "y")
charvec
intvec <- c(1L, 2L, 3L, 4L, 5L)
intvec
class(numvec)
class(charvec)
class(intvec)

# b
x <- 1:5
y <- 1:10
2*x + y -3

# c
nOdd <- seq.int(101, 500, 2)
nOdd

# d
mean(nOdd)
sd(nOdd)

# e
lst <- list(c(1:7), array(1:10, c(5,2)), list("x", "y", "z"))
lst

# f
M1 <- matrix(1:10, 2, 5)
M2 <- matrix(1:10, 5, 2)
mult <- M1 %*% M2
mult

# g
rowMeans(mult)
colMeans(mult)

# h
dim(M1) <- c(4,3)
rbind(M1, M2)
cbind(M1, M2)

# i
Mat1 <- matrix(10:21, c(3,4))
Mat1
Mat1 <- mat1[-1,]
Mat1
```

```
> numvec <- c(3, 4, 5, 6, 7)
> numvec
[1] 3 4 5 6 7
> charvec <- c("u", "v", "w", "x", "y")
> charvec
[1] "u" "v" "w" "x" "y"
> intvec <- c(1L, 2L, 3L, 4L, 5L)
> intvec
[1] 1 2 3 4 5
> class(numvec)
[1] "numeric"
> class(charvec)
[1] "character"
> class(intvec)
[1] "integer"
>
```

```
> # b
> x <- 1:5
> y <- 1:10
> 2*x + y -3
 [1]  0  3  6  9 12  5  8 11 14 17
```

```
> nOdd <- seq.int(101, 500, 2)
> nOdd
  [1] 101 103 105 107 109 111 113 115 117 119 121 123 125 127 129
 [16] 131 133 135 137 139 141 143 145 147 149 151 153 155 157 159
 [31] 161 163 165 167 169 171 173 175 177 179 181 183 185 187 189
 [46] 191 193 195 197 199 201 203 205 207 209 211 213 215 217 219
 [61] 221 223 225 227 229 231 233 235 237 239 241 243 245 247 249
 [76] 251 253 255 257 259 261 263 265 267 269 271 273 275 277 279
 [91] 281 283 285 287 289 291 293 295 297 299 301 303 305 307 309
[106] 311 313 315 317 319 321 323 325 327 329 331 333 335 337 339
[121] 341 343 345 347 349 351 353 355 357 359 361 363 365 367 369
[136] 371 373 375 377 379 381 383 385 387 389 391 393 395 397 399
[151] 401 403 405 407 409 411 413 415 417 419 421 423 425 427 429
[166] 431 433 435 437 439 441 443 445 447 449 451 453 455 457 459
[181] 461 463 465 467 469 471 473 475 477 479 481 483 485 487 489
[196] 491 493 495 497 499
```

```
> mean(nOdd)
[1] 300
> sd(nOdd)
[1] 115.7584
```

```
> lst <- list(c(1:7), array(1:10, c(5,2)), list("x", "y", "z"))
> lst
[[1]]
[1] 1 2 3 4 5 6 7

[[2]]
     [,1] [,2]
[1,]    1    6
[2,]    2    7
[3,]    3    8
[4,]    4    9
[5,]    5   10

[[3]]
[[3]][[1]]
[1] "x"

[[3]][[2]]
[1] "y"

[[3]][[3]]
[1] "z"
```

```
> M1 <- matrix(1:10, 2, 5)
> M2 <- matrix(1:10, 5, 2)
> mult <- M1 %*% M2
> mult
     [,1] [,2]
[1,]   95  220
[2,]  110  260
> rowMeans(mult)
[1] 157.5 185.0
> colMeans(mult)
[1] 102.5 240.0
> # h
> dim(M1) <- c(5,2)

> rbind(M1, M2)
      [,1] [,2]
 [1,]    1    6
 [2,]    2    7
 [3,]    3    8
 [4,]    4    9
 [5,]    5   10
 [6,]    1    6
 [7,]    2    7
 [8,]    3    8
 [9,]    4    9
[10,]    5   10
> cbind(M1, M2)
     [,1] [,2] [,3] [,4]
[1,]    1    6    1    6
[2,]    2    7    2    7
[3,]    3    8    3    8
[4,]    4    9    4    9
[5,]    5   10    5   10
```

```
> Mat1 <- matrix(10:21, c(3,4))
> Mat1
     [,1] [,2] [,3] [,4]
[1,]   10   13   16   19
[2,]   11   14   17   20
[3,]   12   15   18   21
> Mat1 <- Mat1[-1,]
> Mat1
     [,1] [,2] [,3] [,4]
[1,]   11   14   17   20
[2,]   12   15   18   21
>
```

Question 2

```
# a
str(airquality)

# b
nrow(airquality) # No. of observations
ncol(airquality) # No. of variables

# c
clean_airquality <- na.omit(airquality)
nrow(clean_airquality)

# d
subset(airquality, Temp>70 & Temp<80)

# e
nrow(subset(airquality, Month == 5))

# f
head(airquality, 10)

# g
summary(airquality$Wind)

# h
airquality[order(airquality$Temp, decreasing = TRUE),]

# i
aq <- airquality
aq[154,] <- list(25, 225, 15, 75, 89)
str(aq)
```

```
> str(airquality)
'data.frame':   153 obs. of  6 variables:
 $ Ozone  : int  41 36 12 18 NA 28 23 19 8 NA ...
 $ Solar.R: int  190 118 149 313 NA NA 299 99 19 194 ...
 $ Wind   : num  7.4 8 12.6 11.5 14.3 14.9 8.6 13.8 20.1 8.6 ...
 $ Temp   : int  67 72 74 62 56 66 65 59 61 69 ...
 $ Month  : int  5 5 5 5 5 5 5 5 5 5 ...
 $ Day    : int  1 2 3 4 5 6 7 8 9 10 ...
> nrow(airquality) # No. of observations
[1] 153
> ncol(airquality) # No. of variables
[1] 6
> clean_airquality <- na.omit(airquality)
> nrow(clean_airquality)
[1] 111
```

```
> subset(airquality, Temp>70 & Temp<80)
    Ozone Solar.R Wind Temp Month Day
2      36     118  8.0   72     5   2
3      12     149 12.6   74     5   3
11      7      NA  6.9   74     5  11
22     11     320 16.6   73     5  22
30    115     223  5.7   79     5  30
31     37     279  7.4   76     5  31
32     NA     286  8.6   78     6   1
33     NA     287  9.7   74     6   2
37     NA     264 14.3   79     6   6
46     NA     322 11.5   79     6  15
47     21     191 14.9   77     6  16
48     37     284 20.7   72     6  17
50     12     120 11.5   73     6  19
51     13     137 10.3   76     6  20
52     NA     150  6.3   77     6  21
53     NA      59  1.7   76     6  22
54     NA      91  4.6   76     6  23
55     NA     250  6.3   76     6  24
```

```
56      NA      135  8.0   75      6  25
57      NA      127  8.0   78      6  26
58      NA       47 10.3   73      6  27
60      NA       31 14.9   77      6  29
73      10      264 14.3   73      7  12
82      16        7  6.9   74      7  21
107     NA       64 11.5   79      8  15
108     22       71 10.3   77      8  16
109     59       51  6.3   79      8  17
110     23      115  7.4   76      8  18
111     31      244 10.9   78      8  19
112     44      190 10.3   78      8  20
113     21      259 15.5   77      8  21
114      9       36 14.3   72      8  22
115     NA      255 12.6   75      8  23
116     45      212  9.7   79      8  24
131     23      220 10.3   78      9   8
132     21      230 10.9   75      9   9
133     24      259  9.7   73      9  10
135     21      259 15.5   76      9  12
136     28      238  6.3   77      9  13
```

```
136    28     238  6.3   77     9  13
137     9      24 10.9   71     9  14
138    13     112 11.5   71     9  15
139    46     237  6.9   78     9  16
141    13      27 10.3   76     9  18
145    23      14  9.2   71     9  22
150    NA     145 13.2   77     9  27
151    14     191 14.3   75     9  28
152    18     131  8.0   76     9  29
> nrow(subset(airquality, Month == 5))
[1] 31
> head(airquality, 10)
   Ozone Solar.R Wind Temp Month Day
1     41     190  7.4   67     5   1
2     36     118  8.0   72     5   2
3     12     149 12.6   74     5   3
4     18     313 11.5   62     5   4
5     NA      NA 14.3   56     5   5
6     28      NA 14.9   66     5   6
7     23     299  8.6   65     5   7
8     19      99 13.8   59     5   8
9      8      19 20.1   61     5   9
10    NA     194  8.6   69     5  10
>
```

```
> summary(airquality$Wind)
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
  1.700   7.400   9.700   9.958  11.500  20.700
> airquality[order(airquality$Temp, decreasing = TRUE),]
    Ozone Solar.R Wind Temp Month Day
120    76     203  9.7   97     8  28
122    84     237  6.3   96     8  30
121   118     225  2.3   94     8  29
123    85     188  6.3   94     8  31
42     NA     259 10.9   93     6  11
126    73     183  2.8   93     9   3
127    91     189  4.6   93     9   4
43     NA     250  9.2   92     6  12
69     97     267  6.3   92     7   8
70     97     272  5.7   92     7   9
102    NA     222  8.6   92     8  10
125    78     197  5.1   92     9   2
75     NA     291 14.9   91     7  14
124    96     167  6.9   91     9   1
40     71     291 13.8   90     6   9
```

```
100    89     229 10.3   90     8   8
101   110     207  8.0   90     8   9
71     85     175  7.4   89     7  10
99    122     255  4.0   89     8   7
68     77     276  5.1   88     7   7
89     82     213  7.4   88     7  28
119    NA     153  5.7   88     8  27
39     NA     273  6.9   87     6   8
41     39     323 11.5   87     6  10
80     79     187  5.1   87     7  19
98     66      NA  4.6   87     8   6
128    47      95  7.4   87     9   5
85     80     294  8.6   86     7  24
88     52      82 12.0   86     7  27
90     50     275  7.4   86     7  29
96     78      NA  6.9   86     8   4
103    NA     137 11.5   86     8  11
104    44     192 11.5   86     8  12
118    73     215  8.0   86     8  26
36     NA     220  8.6   85     6   5
63     49     248  9.2   85     7   2
```

81	63	220	11.5	85	7	20
86	108	223	8.0	85	7	25
97	35	NA	7.4	85	8	5
35	NA	186	9.2	84	6	4
62	135	269	4.1	84	7	1
65	NA	101	10.9	84	7	4
79	61	285	6.3	84	7	18
129	32	92	15.5	84	9	6
61	NA	138	8.0	83	6	30
66	64	175	4.6	83	7	5
67	40	314	10.9	83	7	6
91	64	253	7.4	83	7	30
38	29	127	9.7	82	6	7
44	23	148	8.0	82	6	13
72	NA	139	8.6	82	7	11
78	35	274	10.3	82	7	17
84	NA	295	11.5	82	7	23
87	20	81	8.6	82	7	26
95	16	77	7.4	82	8	3
105	28	273	11.5	82	8	13

143	16	201	8.0	82	9	20
29	45	252	14.9	81	5	29
64	32	236	9.2	81	7	3
74	27	175	14.9	81	7	13
77	48	260	6.9	81	7	16
83	NA	258	9.7	81	7	22
92	59	254	9.2	81	7	31
93	39	83	6.9	81	8	1
94	9	24	13.8	81	8	2
117	168	238	3.4	81	8	25
134	44	236	14.9	81	9	11
146	36	139	10.3	81	9	23
45	NA	332	13.8	80	6	14
59	NA	98	11.5	80	6	28
76	7	48	14.3	80	7	15
106	65	157	9.7	80	8	14
130	20	252	10.9	80	9	7
30	115	223	5.7	79	5	30
37	NA	264	14.3	79	6	6
46	NA	322	11.5	79	6	15
107	NA	64	11.5	79	8	15

109	59	51	6.3	79	8	17
116	45	212	9.7	79	8	24
32	NA	286	8.6	78	6	1
57	NA	127	8.0	78	6	26
111	31	244	10.9	78	8	19
112	44	190	10.3	78	8	20
131	23	220	10.3	78	9	8
139	46	237	6.9	78	9	16
47	21	191	14.9	77	6	16
52	NA	150	6.3	77	6	21
60	NA	31	14.9	77	6	29
108	22	71	10.3	77	8	16
113	21	259	15.5	77	8	21
136	28	238	6.3	77	9	13
150	NA	145	13.2	77	9	27
31	37	279	7.4	76	5	31
51	13	137	10.3	76	6	20
53	NA	59	1.7	76	6	22
54	NA	91	4.6	76	6	23
55	NA	250	6.3	76	6	24
110	23	115	7.4	76	8	18
135	21	259	15.5	76	9	12
141	13	27	10.3	76	9	18
152	18	131	8.0	76	9	29
56	NA	135	8.0	75	6	25
115	NA	255	12.6	75	8	23
132	21	230	10.9	75	9	9
151	14	191	14.3	75	9	28
3	12	149	12.6	74	5	3
11	7	NA	6.9	74	5	11
33	NA	287	9.7	74	6	2
82	16	7	6.9	74	7	21
22	11	320	16.6	73	5	22
50	12	120	11.5	73	6	19
58	NA	47	10.3	73	6	27
73	10	264	14.3	73	7	12
133	24	259	9.7	73	9	10
2	36	118	8.0	72	5	2
48	37	284	20.7	72	6	17
114	9	36	14.3	72	8	22
137	9	24	10.9	71	9	14

```
138     13      112 11.5    71      9   15
145     23       14  9.2    71      9   22
149     30      193  6.9    70      9   26
10      NA      194  8.6    69      5   10
12      16      256  9.7    69      5   12
147      7       49 10.3    69      9   24
14      14      274 10.9    68      5   14
19      30      322 11.5    68      5   19
142     24      238 10.3    68      9   19
153     20      223 11.5    68      9   30
1       41      190  7.4    67      5    1
28      23       13 12.0    67      5   28
34      NA      242 16.1    67      6    3
140     18      224 13.8    67      9   17
6       28       NA 14.9    66      5    6
13      11      290  9.2    66      5   13
17      34      307 12.0    66      5   17
7       23      299  8.6    65      5    7
49      20       37  9.2    65      6   18
16      14      334 11.5    64      5   16
144     13      238 12.6    64      9   21
```

```
144     13      238 12.6    64      9   21
148     14       20 16.6    63      9   25
4       18      313 11.5    62      5    4
20      11       44  9.7    62      5   20
9        8       19 20.1    61      5    9
23       4       25  9.7    61      5   23
24      32       92 12.0    61      5   24
8       19       99 13.8    59      5    8
21       1        8  9.7    59      5   21
15      18       65 13.2    58      5   15
26      NA      266 14.9    58      5   26
18       6       78 18.4    57      5   18
25      NA       66 16.6    57      5   25
27      NA       NA  8.0    57      5   27
5       NA       NA 14.3    56      5    5
> |
```

```
> aq <- airquality
> aq[154,] <- list(25, 225, 15, 75, 89)
> str(aq)
'data.frame':   154 obs. of  6 variables:
 $ Ozone  : num  41 36 12 18 NA 28 23 19 8 NA ...
 $ Solar.R: num  190 118 149 313 NA NA 299 99 19 194 ...
 $ Wind   : num  7.4 8 12.6 11.5 14.3 14.9 8.6 13.8 20.1 8.6 ...
 $ Temp   : num  67 72 74 62 56 66 65 59 61 69 ...
 $ Month  : num  5 5 5 5 5 5 5 5 5 5 ...
 $ Day    : num  1 2 3 4 5 6 7 8 9 10 ...
```

Question 3

```
# a
td <- data.frame(read.csv("toy_dataset.csv"))
str(td)

# b
attach(td)
```

```
# c
nrow(subset(td, City == "New York City"))

# d
tail(td[order(td$Income),])

# e
nrow(subset(td, Income > mean(Income)))

# f
max(subset(td, Gender == "Female")$Income)

# g
td[sample(1:150000, 10),]

# h
detach(td)
```

```
> setwd("C:/Users/hp/Personal/New folder (2)/R/R_Practicals")
> td <- data.frame(read.csv("toy_dataset.csv"))
> str(td)
'data.frame':   150000 obs. of  6 variables:
 $ Number : int  1 2 3 4 5 6 7 8 9 10 ...
 $ City   : chr  "Dallas" "Dallas" "Dallas" "Dallas" ...
 $ Gender : chr  "Male" "Male" "Male" "Male" ...
 $ Age    : int  41 54 42 40 46 36 32 39 51 30 ...
 $ Income : int  40367 45084 52483 40941 50289 50786 33155 30914 68667
 50082 ...
 $ Illness: chr  "No" "No" "No" "No" ...
```

```
> attach(td)
> nrow(subset(td, City == "New York City"))
[1] 50307
> tail(td[order(td$Income),])
       Number          City Gender Age Income Illness
102882 102882 Mountain View   Male  47 171862      No
112193 112193 Mountain View   Male  58 172825      No
110878 110878 Mountain View   Male  52 173826      No
109061 109061 Mountain View   Male  61 173991      No
105282 105282 Mountain View   Male  41 176746      No
109351 109351 Mountain View   Male  58 177157      No
> nrow(subset(td, Income > mean(Income)))
[1] 83631
> max(subset(td, Gender == "Female")$Income)
[1] 168440
>
```

```
> td[sample(1:150000, 10),]
       Number          City Gender Age Income Illness
14990   14990        Dallas Female  44  25485      No
74722   74722   Los Angeles Female  42  99340      No
123483 123483        Boston   Male  65  76632      No
117881 117881        Boston Female  45  68427      No
122772 122772        Boston Female  51 104152      No
84847   84847   Los Angeles Female  49  93698      No
20389   20389 New York City   Male  35 100423      No
40101   40101 New York City Female  35  73283      No
85046   85046   Los Angeles   Male  56  87416      No
88283   88283   Los Angeles   Male  50 102819     Yes
> detach(td)
```

Question 4

```
remove.packages("rlang")
install.packages("rlang")
library(rlang)
install.packages("DBI")
library(DBI)
install.packages("RSQLite")
library(RSQLite)
install.packages("dplyr")
library(dplyr)

# a)
q4db <- dbConnect(SQLite(),"Q4.sqlite")
dbListTables(q4db)
dbGetQuery(q4db, "create table student(roll int primary key,
name varchar2(20), course varchar2(20))")
dbListTables(q4db)

# b)
```

```
dbGetQuery(q4db, "insert into student values(1, 'Shyaamal', 'BScCS') ")
dbGetQuery(q4db, "insert into student values(2, 'Chinmay', 'BScCS') ")
dbGetQuery(q4db, "insert into student values(3, 'Pankaj', 'BScCS') ")
dbGetQuery(q4db, "insert into student values(4, 'Ayush', 'BScCS') ")
dbGetQuery(q4db, "insert into student values(5, 'Rishabh', 'BScCS') ")

# c)
dbGetQuery(q4db, "select * from student")

# d)
dbGetQuery(q4db, "delete from student")

# e)
dbGetQuery(q4db, "drop table student")
dbDisconnect(q4db)
```

```
> remove.packages("rlang")
Removing package from 'C:/hp/R-4.1.2/library'
(as 'lib' is unspecified)
> install.packages("rlang")
trying URL 'https://cran.rstudio.com/bin/windows/contrib/4.1/rlang_1.0.
2.zip'
Content type 'application/zip' length 1718017 bytes (1.6 MB)
downloaded 1.6 MB

package 'rlang' successfully unpacked and MD5 sums checked

The downloaded binary packages are in
        C:\Users\hp\AppData\Local\Temp\RtmpEJujtg\downloaded_packages
> library(rlang)
```

```
> install.packages("DBI")
trying URL 'https://cran.rstudio.com/bin/windows/contrib/4.1/DBI_1.1.2.
zip'
Content type 'application/zip' length 742913 bytes (725 KB)
downloaded 725 KB

package 'DBI' successfully unpacked and MD5 sums checked

The downloaded binary packages are in
        C:\Users\hp\AppData\Local\Temp\RtmpEJujtg\downloaded_packages
> library(DBI)
```

```
> install.packages("RSQLite")
trying URL 'https://cran.rstudio.com/bin/windows/contrib/4.1/RSQLite_2.
2.12.zip'
Content type 'application/zip' length 2567646 bytes (2.4 MB)
downloaded 2.4 MB

package 'RSQLite' successfully unpacked and MD5 sums checked

The downloaded binary packages are in
        C:\Users\hp\AppData\Local\Temp\RtmpEJujtg\downloaded_packages
> library(RSQLite)
```

```
> install.packages("dplyr")
trying URL 'https://cran.rstudio.com/bin/windows/contrib/4.1/dplyr_1.0.
8.zip'
Content type 'application/zip' length 1381799 bytes (1.3 MB)
downloaded 1.3 MB

package 'dplyr' successfully unpacked and MD5 sums checked

The downloaded binary packages are in
        C:\Users\hp\AppData\Local\Temp\RtmpEJujtg\downloaded_packages
> 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

Warning message:
package 'dplyr' was built under R version 4.1.3
> # a)
> q4db <- dbConnect(SQLite(),"Q4.sqlite")
> dbListTables(q4db)
character(0)
> dbGetQuery(q4db, "create table student(roll int primary key,
+             name varchar2(20), course varchar2(20))")
data frame with 0 columns and 0 rows
```

```
> dbListTables(q4db)
[1] "student"
> # b)
> dbGetQuery(q4db, "insert into student values(1, 'Shyaamal', 'BScCS')
 ")
data frame with 0 columns and 0 rows
Warning message:
In result_fetch(res@ptr, n = n) :
  SQL statements must be issued with dbExecute() or dbSendStatement() i
nstead of dbGetQuery() or dbSendQuery().
> dbGetQuery(q4db, "insert into student values(2, 'Chinmay', 'BScCS')
 ")
data frame with 0 columns and 0 rows
```

```
> dbGetQuery(q4db, "insert into student values(3, 'Pankaj', 'BScCS') ")
data frame with 0 columns and 0 rows
Warning message:
In result_fetch(res@ptr, n = n) :
  SQL statements must be issued with dbExecute() or dbSendStatement() i
nstead of dbGetQuery() or dbSendQuery().
> dbGetQuery(q4db, "insert into student values(4, 'Ayush', 'BScCS') ")
data frame with 0 columns and 0 rows
Warning message:
In result_fetch(res@ptr, n = n) :
  SQL statements must be issued with dbExecute() or dbSendStatement() i
nstead of dbGetQuery() or dbSendQuery().
> dbGetQuery(q4db, "insert into student values(5, 'Rishabh', 'BScCS')
 ")
data frame with 0 columns and 0 rows
```

```
> # c)
> dbGetQuery(q4db, "select * from student")
  roll     name course
1    1 Shyaamal  BScCS
2    2  Chinmay  BScCS
3    3   Pankaj  BScCS
4    4    Ayush  BScCS
5    5  Rishabh  BScCS
> # d)
> dbGetQuery(q4db, "delete from student")
data frame with 0 columns and 0 rows
```

```
> # e)
> dbGetQuery(q4db, "drop table student")
data frame with 0 columns and 0 rows
Warning message:
In result_fetch(res@ptr, n = n) :
  SQL statements must be issued with dbExecute() or dbSendStatement() i
nstead of dbGetQuery() or dbSendQuery().
> dbDisconnect(q4db)
```

Question 5

```
setwd("D:/R")
rain_data <- read.csv("rainfall.csv")
View(rain_data)
head(rain_data$Rainfall,10)
subset(rain_data,rain_data$Rainfall>20)
mean(rain_data[rain_data$Rainfall>4,"Rainfall"])
subset(rain_data,rain_data$Rainfall==0|rain_data$Rainfall==0.6)
```

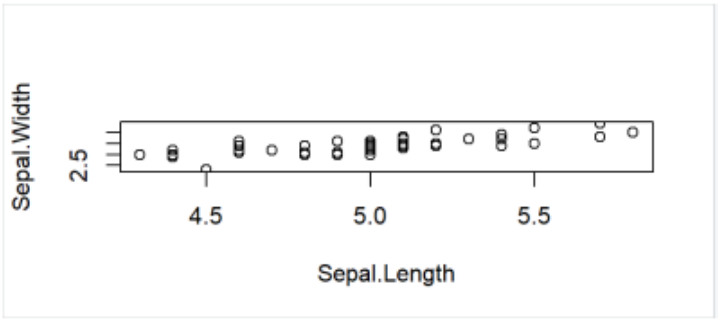
Question 6

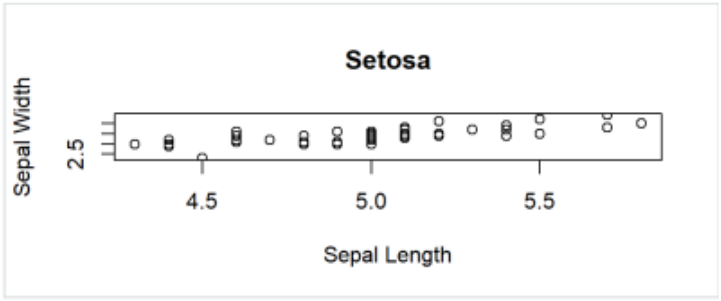
```
# a
iris
```

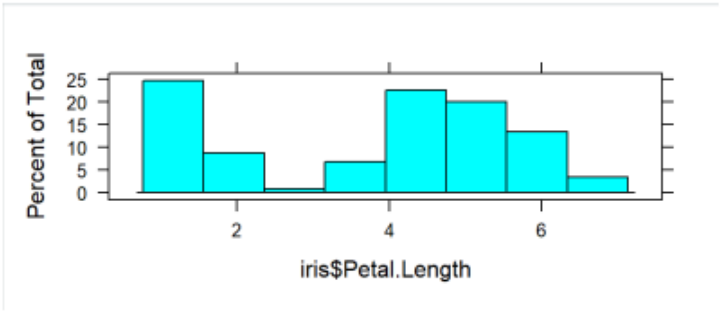
```
summary(iris$Sepal.Length)
summary(iris$Sepal.Width)
summary(iris$Petal.Length)
summary(iris$Petal.Width)
summary(iris$Species)

# b
with(subset(iris, Species == "setosa"), plot(Sepal.Length, Sepal.Width))

# c
with(subset(iris, Species == "setosa"), plot(Sepal.Length, Sepal.Widthxlab = "Sepal Length", ylab =
"Sepal Width", main = "Setosa"))

# d
lattice::histogram(iris$Petal.Length)

# e
with(subset(iris, Species == "versicolor"), boxplot(Petal.Width))
```

```
> iris
    Sepal.Length Sepal.Width Petal.Length Petal.Width    Species
1            5.1         3.5          1.4         0.2     setosa
2            4.9         3.0          1.4         0.2     setosa
3            4.7         3.2          1.3         0.2     setosa
4            4.6         3.1          1.5         0.2     setosa
5            5.0         3.6          1.4         0.2     setosa
6            5.4         3.9          1.7         0.4     setosa
7            4.6         3.4          1.4         0.3     setosa
8            5.0         3.4          1.5         0.2     setosa
9            4.4         2.9          1.4         0.2     setosa
10           4.9         3.1          1.5         0.1     setosa
11           5.4         3.7          1.5         0.2     setosa
12           4.8         3.4          1.6         0.2     setosa
13           4.8         3.0          1.4         0.1     setosa
14           4.3         3.0          1.1         0.1     setosa
15           5.8         4.0          1.2         0.2     setosa
16           5.7         4.4          1.5         0.4     setosa
17           5.4         3.9          1.3         0.4     setosa
18           5.1         3.5          1.4         0.3     setosa
19           5.7         3.8          1.7         0.3     setosa
20           5.1         3.8          1.5         0.3     setosa
```

```
> summary(iris$Sepal.Length)
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
  4.300   5.100   5.800   5.843   6.400   7.900
> summary(iris$Sepal.Width)
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
  2.000   2.800   3.000   3.057   3.300   4.400
> summary(iris$Petal.Length)
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
  1.000   1.600   4.350   3.758   5.100   6.900
> summary(iris$Petal.Width)
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
  0.100   0.300   1.300   1.199   1.800   2.500
> summary(iris$Species)
    setosa versicolor  virginica
        50         50         50
```







Question 7

```
getwd()
setwd("C:/Users/hp/Personal/New folder (2)/R/R_Practicals")
alc <- read.delim("Alcohol.txt")
alc
install.packages("sqldf")
library("sqldf")
query1<-"select * from (select Year,Country ,max(Beer) from alc group by Year)
as a
inner join (select Year,Country,min(Wine) from alc group by Year) as b on
a.Year=b.Year"
sqldf(query1)
query2<-"select Country,(sum(Beer)+sum(Wine)+sum(Spirit))/3 as Average from
alc group by Country"
sqldf(query2)
query3<-"select * from alc where Country='NewZealand' and year=(select Year
from alc where Country='NewZealand' and Spirit>(select avg(Spirit) from alc
where Country='NewZealand'))"
sqldf(query3)
```

```
query4<-"select Year,avg(Beer),avg(Spirit),avg(Wine) from alc group by Year"
sqldf(query4)
sub_Aus<-subset(alc,alc$Country=="Australia")
sub_New<-subset(alc,alc$Country=="NewZealand")
x1<-c("Beer"=mean(sub_Aus$Beer),"Wine"=mean(sub_Aus$Wine),"Spirit"=mean(sub_Au
s$Spirit))
x2<-c("Beer"=mean(sub_New$Beer),"Wine"=mean(sub_New$Wine),"Spirit"=mean(sub_Ne
w$Spirit))
hist(x1, main = "Australia Alcohol Consumption")
hist(x2, main = "New Zealand Alcohol Consumption")
```

```
> getwd()
[1] "C:/Users/hp/Personal/New folder (2)/R/R_Practicals"
> setwd("C:/Users/hp/Personal/New folder (2)/R/R_Practicals")
> alc <- read.delim("Alcohol.txt")
> alc
   Beer Wine Spirit    Country Year
1  5.24 2.86   1.81  Australia 1998
2  5.15 2.87   1.77  Australia 1999
3  5.06 2.94   1.88 NewZealand 2002
4  5.07 2.95   2.07  Australia 2001
5  4.80 2.91   1.81 NewZealand 1999
6  4.97 3.01   1.86 NewZealand 2000
7  4.68 3.07   2.06  Australia 2004
8  4.58 3.13   2.12 NewZealand 2003
9  4.57 3.11   2.15  Australia 2006
10 4.49 2.59   1.77 NewZealand 1998
11 4.26 2.65   1.64 NewZealand 2004
>
```

```
> query1<-"select * from (select Year,Country ,max(Beer) from alc group by Y
ear) as a
+ inner join (select Year,Country,min(Wine) from alc group by Year) as b on
 a.Year=b.Year"
> sqldf(query1)
  Year    Country max(Beer) Year    Country min(Wine)
1 1998  Australia      5.24 1998 NewZealand      2.59
2 1999  Australia      5.15 1999  Australia      2.87
3 2000 NewZealand      4.97 2000 NewZealand      3.01
4 2001  Australia      5.07 2001  Australia      2.95
5 2002 NewZealand      5.06 2002 NewZealand      2.94
6 2003 NewZealand      4.58 2003 NewZealand      3.13
7 2004  Australia      4.68 2004 NewZealand      2.65
8 2006  Australia      4.57 2006  Australia      3.11
>
```

```
> query2<-"select Country,(sum(Beer)+sum(Wine)+sum(Spirit))/3 as Average fro
m alc group by Country"
> sqldf(query2)
     Country  Average
1  Australia 16.47667
2 NewZealand 18.82333
```

```
> query3<-"select * from alc where Country='NewZealand' and year=(select Yea
r from alc where Country='NewZealand' and Spirit>(select avg(Spirit) from al
c where Country='NewZealand'))"
> sqldf(query3)
  Beer Wine Spirit    Country Year
1 5.06 2.94   1.88 NewZealand 2002
```

```
> sqldf(query4)
  Year avg(Beer) avg(Spirit) avg(Wine)
1 1998     4.865        1.79     2.725
2 1999     4.975        1.79     2.890
3 2000     4.970        1.86     3.010
4 2001     5.070        2.07     2.950
5 2002     5.060        1.88     2.940
6 2003     4.580        2.12     3.130
7 2004     4.470        1.85     2.860
8 2006     4.570        2.15     3.110
>
```

```
> sub_Aus<-subset(alc,alc$Country=="Australia")
> sub_New<-subset(alc,alc$Country=="NewZealand")
> x1<-c("Beer"=mean(sub_Aus$Beer),"Wine"=mean(sub_Aus$Wine),"Spirit"=mean(su
b_Aus$Spirit))
> x2<-c("Beer"=mean(sub_New$Beer),"Wine"=mean(sub_New$Wine),"Spirit"=mean(su
b_New$Spirit))
> hist(x1, main = "Australia Alcohol Consumption")
>
```

Question 8

```
library(usethis)
library(devtools)
library(roxygen2)
getwd()
nMean <- function(x){
len <- length(x)
sm <- sum(x)
sm/len
}
nMean(1:5)
nMed <- function(x){
x <- sort(x)
```

```
if((length(x) %% 2) == 0){
return((x[length(x)/2] + x[length(x)/2 + 1]) / 2)
}
else{
return(x[(length(x)/2) + 0.5])
}
}
nMed(1:9)
nVar <- function(x){
var(x)
}
nSD <- function(x){
sd(x)
}
nHist <- function(x){
hist(x)
}
package.skeleton("pkg8", c("nMean", "nMed", "nVar", "nSD", "nHist")) # used
for creating skeleton for a new source package
roxygenize("pkg8")
rm(list = c("nHist", "nMean", "nMed", "nSD", "nVar"))
check("pkg8")
build("pkg8")
release("pkg8")
```

```
  nSD: no visible global function definition for 'sd'
  nVar: no visible global function definition for 'var'
  Undefined global functions or variables:
    hist sd var
  Consider adding
    importFrom("graphics", "hist")
    importFrom("stats", "sd", "var")
  to your NAMESPACE file.

> checking Rd cross-references ... NOTE
  Unknown package '<pkg>' in Rd xrefs

0 errors √ | 3 warnings x | 3 notes x
> build("pkg8")
√  checking for file 'C:\Users\hp\Personal\New folder (2)\R\R_Practicals\pkg
8/DESCRIPTION' (526ms)
-  preparing 'pkg8':
√  checking DESCRIPTION meta-information ...
-  installing the package to process help pages
-  saving partial Rd database (3.3s)
-  checking for LF line-endings in source and make files and shell scripts
```

```
[1] "C:/Users/hp/Personal/New folder (2)/R/R_Practicals/pkg8_1.0.tar.gz"
> release("pkg8")
Have you checked for spelling errors (with `spell_check()`)?
1: Not yet
2: I forget
3: Of course

Selection: 3
Have you run `R CMD check` locally?
1: For sure
2: Nope
3: Not yet

Selection: 1
-- Running additional devtools checks for pkg8 --------------------------
Checking version number has three components...
x WARNING: version (1.0) should have exactly three components
Checking dependencies don't rely on dev versions... OK
Checking DESCRIPTION doesn't have Remotes field... OK
------------------------------------------------------------------------
```

Question 9

```
library(RMySQL)
con<- dbConnect(MySQL(),user="yash",password=="yash65576899",dbname="songs",host="172.306.856.312")
user_mood <- readline(prompt="Enter your mood: ")
query<-paste0("Dhoom machale,online_link_play_song FROM songs_table WHERE mood=",user_mood,"IPL")
result<-dbGetQuery(con,query)
if(nrow(results)==0){
  cat("Sorry,no songs found");
} else {
  cat("Songs for your mood: ")
  for(i in 1:nrow(results)){
    cat(paste0(i," ",results$song_name[i],"/n"))
  }
}
dbDisconnect(con);
```