RWorksheet_Lego#6

2023-12-13

#Compute the descriptive statistics using different packages (Hmisc and pastecs).

#Write the codes and its result.

```
library(Hmisc)
```

```
##
## Attaching package: 'Hmisc'
```

```
## The following objects are masked from 'package:base':
##
##     format.pval, units
```

```
students<-c(1:10)
preT<- c(55,54,47,57,51,61,57,54,63,58)
postT<- c(61,60,56,63,56,63,59,56,62,61)

data<- data.frame(
  Student = students,
  PreTest = preT,
  PostTest = postT
  )

data
```

```
##    Student PreTest PostTest
## 1        1      55       61
## 2        2      54       60
## 3        3      47       56
## 4        4      57       63
## 5        5      51       56
## 6        6      61       63
## 7        7      57       59
## 8        8      54       56
## 9        9      63       62
## 10      10      58       61
```

```
num1<- describe(data)
num1
```

```
## data
##
##  3  Variables      10  Observations
## --------------------------------------------------------------------------------
## Student
##        n  missing distinct     Info     Mean      Gmd      .05      .10
##       10        0       10        1      5.5    3.667     1.45     1.90
##      .25      .50      .75      .90      .95
```

```
##     3.25     5.50     7.75     9.10     9.55
##
## Value        1   2   3   4   5   6   7   8   9  10
## Frequency    1   1   1   1   1   1   1   1   1   1
## Proportion 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1
##
## For the frequency table, variable is rounded to the nearest 0
## ----------------------------------------------------------------------------
## PreTest
##        n  missing distinct     Info     Mean      Gmd
##       10        0        8    0.988     55.7    5.444
##
## Value       47  51  54  55  57  58  61  63
## Frequency    1   1   2   1   2   1   1   1
## Proportion 0.1 0.1 0.2 0.1 0.2 0.1 0.1 0.1
##
## For the frequency table, variable is rounded to the nearest 0
## ----------------------------------------------------------------------------
## PostTest
##        n  missing distinct     Info     Mean      Gmd
##       10        0        6    0.964     59.7    3.311
##
## Value       56  59  60  61  62  63
## Frequency    3   1   1   2   1   2
## Proportion 0.3 0.1 0.1 0.2 0.1 0.2
##
## For the frequency table, variable is rounded to the nearest 0
## ----------------------------------------------------------------------------
```

```r
library(pastecs)

students<-c(1:10)
preT<- c(55,54,47,57,51,61,57,54,63,58)
postT<- c(61,60,56,63,56,63,59,56,62,61)

data2<- data.frame(
  Student = students,
  PreTest = preT,
  PostTest = postT
  )

data2
```

```
##    Student PreTest PostTest
## 1        1      55       61
## 2        2      54       60
## 3        3      47       56
## 4        4      57       63
## 5        5      51       56
## 6        6      61       63
## 7        7      57       59
## 8        8      54       56
## 9        9      63       62
## 10      10      58       61
```

```
num1a<- stat.desc(data)
num1a
```

```
##                 Student      PreTest     PostTest
## nbr.val      10.0000000  10.00000000  10.00000000
## nbr.null      0.0000000   0.00000000   0.00000000
## nbr.na        0.0000000   0.00000000   0.00000000
## min           1.0000000  47.00000000  56.00000000
## max          10.0000000  63.00000000  63.00000000
## range         9.0000000  16.00000000   7.00000000
## sum          55.0000000 557.00000000 597.00000000
## median        5.5000000  56.00000000  60.50000000
## mean          5.5000000  55.70000000  59.70000000
## SE.mean       0.9574271   1.46855938   0.89504811
## CI.mean.0.95  2.1658506   3.32211213   2.02473948
## var           9.1666667  21.56666667   8.01111111
## std.dev       3.0276504   4.64399254   2.83039063
## coef.var      0.5504819   0.08337509   0.04741023
```

#2. The Department of Agriculture was studying the effects of several levels of a fertilizer on the growth of a plant. For some analyses, it might be useful to convert the fertilizer levels to an ordered factor.

#The data were 10,10,10, 20,20,50,10,20,10,50,20,50,20,10. ##a. Write the #codes and describe the result.

```
fertilizer_level<- c(10,10,10, 20,20,50,10,20,10,50,20,50,20,10)

fertilizer<- ordered(fertilizer_level, levels= c(10,20,50))

fertilizer
```

```
##  [1] 10 10 10 20 20 50 10 20 10 50 20 50 20 10
## Levels: 10 < 20 < 50
```

```
'The data have been converted to an ordered factor, and the levels are ordered as 10<20<50.'
```

```
## [1] "The data have been converted to an ordered factor, and the levels are ordered as 10<20<50."
```

#3. Abdul Hassan, president of Floor Coverings Unlimited, has asked you to study the exercise levels undertaken by 10 subjects were “l”, “n”, “n”, “i”, “l” , “l”, “n”, “n”, “i”, “l” ; n=none, l=light, i=intense

#a. What is the best way to represent this in R?

```
exercise_levels <- c("l", "n", "n", "i", "l", "l", "n", "n", "i", "l")
exercise<- factor(exercise_levels, levels = c("n", "l", "i"), labels= c("none", "light", "intense"))

exercise
```

```
##  [1] light   none    none    intense light   light   none    none    intense
## [10] light
## Levels: none light intense
```

#4.Sample of 30 tax accountants from all the states and territories of Australia and their individual state of origin is specified by a character vector of state mnemonics as:state <- c(“tas”, “sa”, “qld”, “nsw”, “nsw”, “nt”, “wa”, “wa”, “qld”,“vic”, “nsw”, “vic”, “qld”, “qld”, “sa”, “tas”, “sa”, “nt”,“wa”, “vic”, “qld”, “nsw”, “nsw”, “wa”, “sa”, “act”, “nsw”,“vic”, “vic”, “act”)

#a. Apply the factor function and factor level. Describe the results.

```
state <- c("tas", "sa", "qld", "nsw", "nsw", "nt", "wa", "wa", "qld","vic", "nsw", "vic", "qld", "qld",
```

```
state_factor<- factor(state)

state_factor
```

```
##  [1] tas sa  qld nsw nsw nt  wa  wa  qld vic nsw vic qld qld sa  tas sa  nt  wa
## [20] vic qld nsw nsw wa  sa  act nsw vic vic act
## Levels: act nsw nt qld sa tas vic wa
```

```
'This shows  the factor levels assigned to each state in the original order. The levels are automaticall
```

```
## [1] "This shows  the factor levels assigned to each state in the original order. The levels are auto
```

#5. From #4 - continuation: ##Suppose we have the incomes of the same tax accountants in another vector (in suitablylarge units of money) ##incomes <- c(60, 49, 40, 61, 64, 60, 59, 54, 62, 69, 70, 42, 56, 61, 61, 61, 58, 51, 48, 65, 49, 49, 41, 48, 52, 46, 59, 46, 58, 43)

#a. Calculate the sample mean income for each state we can now use the special function tapply():

```
incomes <- c(60, 49, 40, 61, 64, 60, 59, 54, 62, 69, 70, 42, 56, 61, 61, 61, 58, 51, 48, 65, 49, 49, 41

income_means <- tapply(incomes, state_factor, mean)

income_means
```

```
##      act      nsw       nt      qld       sa      tas      vic       wa
## 44.50000 57.33333 55.50000 53.60000 55.00000 60.50000 56.00000 52.25000
```

#b. Copy the results and interpret.

```
 'act      nsw       nt      qld       sa      tas      vic       wa
44.50000 57.33333 55.50000 53.60000 55.00000 60.50000 56.00000 52.25000'
```

```
## [1] "act      nsw       nt      qld       sa      tas      vic       wa \n44.50000 57.33333 55.50000
```

```
'Tax accountants from the Australian Capital Territory (act) have a mean income of 44.50.'
```

```
## [1] "Tax accountants from the Australian Capital Territory (act) have a mean income of 44.50."
```

```
'New South Wales (nsw) tax accountants have a mean income of 57.33.'
```

```
## [1] "New South Wales (nsw) tax accountants have a mean income of 57.33."
```

```
'Northern Territory (nt) tax accountants have a mean income of 55.50 and so on for the others'
```

```
## [1] "Northern Territory (nt) tax accountants have a mean income of 55.50 and so on for the others"
```

```
'This analysis provides insights into the average income of tax accountants in each state based on the p
```

```
## [1] "This analysis provides insights into the average income of tax accountants in each state based
```

#7.Use the titanic dataset. ##a. subset the titatic dataset of those who survived and not survived. Show the codes and its result.

```
titanic<- as.data.frame(Titanic)

survived<- subset(titanic, Survived == 'Yes')
survived
```

```
##    Class    Sex   Age Survived Freq
## 17   1st   Male Child      Yes    5
## 18   2nd   Male Child      Yes   11
## 19   3rd   Male Child      Yes   13
```

```
## 20  Crew   Male Child      Yes    0
## 21   1st Female Child      Yes    1
## 22   2nd Female Child      Yes   13
## 23   3rd Female Child      Yes   14
## 24  Crew Female Child      Yes    0
## 25   1st   Male Adult      Yes   57
## 26   2nd   Male Adult      Yes   14
## 27   3rd   Male Adult      Yes   75
## 28  Crew   Male Adult      Yes  192
## 29   1st Female Adult      Yes  140
## 30   2nd Female Adult      Yes   80
## 31   3rd Female Adult      Yes   76
## 32  Crew Female Adult      Yes   20
```

```
not<- subset(titanic, Survived == 'No')
not
```

```
##    Class    Sex   Age Survived Freq
## 1    1st   Male Child       No    0
## 2    2nd   Male Child       No    0
## 3    3rd   Male Child       No   35
## 4   Crew   Male Child       No    0
## 5    1st Female Child       No    0
## 6    2nd Female Child       No    0
## 7    3rd Female Child       No   17
## 8   Crew Female Child       No    0
## 9    1st   Male Adult       No  118
## 10   2nd   Male Adult       No  154
## 11   3rd   Male Adult       No  387
## 12  Crew   Male Adult       No  670
## 13   1st Female Adult       No    4
## 14   2nd Female Adult       No   13
## 15   3rd Female Adult       No   89
## 16  Crew Female Adult       No    3
```

#8.The data sets are about the breast cancer Wisconsin. The samples arrive periodically as Dr. Wolberg reports his clinical cases. The database therefore reflects this chronologihttps://drive.google.com/file/d/16MFLoehCgx2MJuNSAuB2Csu/view?usp=drive_link) ##Note Kindly click on the word BreastCancer to download the dataset. ##a. describe what is the dataset all about.

```
library(readr)
breastcancer_wisconsin <- read.csv("breastcancer_wisconsin.csv")
breastcancer_wisconsin
```

```
##           id clump_thickness size_uniformity shape_uniformity marginal_adhesion
## 1    1000025               5               1                1                 1
## 2    1002945               5               4                4                 5
## 3    1015425               3               1                1                 1
## 4    1016277               6               8                8                 1
## 5    1017023               4               1                1                 3
## 6    1017122               8              10               10                 8
## 7    1018099               1               1                1                 1
## 8    1018561               2               1                2                 1
## 9    1033078               2               1                1                 1
## 10   1033078               4               2                1                 1
## 11   1035283               1               1                1                 1
```

```
## 12   1036172              2              1              1              1
## 13   1041801              5              3              3              3
## 14   1043999              1              1              1              1
## 15   1044572              8              7              5             10
## 16   1047630              7              4              6              4
## 17   1048672              4              1              1              1
## 18   1049815              4              1              1              1
## 19   1050670             10              7              7              6
## 20   1050718              6              1              1              1
## 21   1054590              7              3              2             10
## 22   1054593             10              5              5              3
## 23   1056784              3              1              1              1
## 24   1057013              8              4              5              1
## 25   1059552              1              1              1              1
## 26   1065726              5              2              3              4
## 27   1066373              3              2              1              1
## 28   1066979              5              1              1              1
## 29   1067444              2              1              1              1
## 30   1070935              1              1              3              1
## 31   1070935              3              1              1              1
## 32   1071760              2              1              1              1
## 33   1072179             10              7              7              3
## 34   1074610              2              1              1              2
## 35   1075123              3              1              2              1
## 36   1079304              2              1              1              1
## 37   1080185             10             10             10              8
## 38   1081791              6              2              1              1
## 39   1084584              5              4              4              9
## 40   1091262              2              5              3              3
## 41   1096800              6              6              6              9
## 42   1099510             10              4              3              1
## 43   1100524              6             10             10              2
## 44   1102573              5              6              5              6
## 45   1103608             10             10             10              4
## 46   1103722              1              1              1              1
## 47   1105257              3              7              7              4
## 48   1105524              1              1              1              1
## 49   1106095              4              1              1              3
## 50   1106829              7              8              7              2
## 51   1108370              9              5              8              1
## 52   1108449              5              3              3              4
## 53   1110102             10              3              6              2
## 54   1110503              5              5              5              8
## 55   1110524             10              5              5              6
## 56   1111249             10              6              6              3
## 57   1112209              8             10             10              1
## 58   1113038              8              2              4              1
## 59   1113483              5              2              3              1
## 60   1113906              9              5              5              2
## 61   1115282              5              3              5              5
## 62   1115293              1              1              1              1
## 63   1116116              9             10             10              1
## 64   1116132              6              3              4              1
## 65   1116192              1              1              1              1
```

66	1116998	10	4	2	1
67	1117152	4	1	1	1
68	1118039	5	3	4	1
69	1120559	8	3	8	3
70	1121732	1	1	1	1
71	1121919	5	1	3	1
72	1123061	6	10	2	8
73	1124651	1	3	3	2
74	1125035	9	4	5	10
75	1126417	10	6	4	1
76	1131294	1	1	2	1
77	1132347	1	1	4	1
78	1133041	5	3	1	2
79	1133136	3	1	1	1
80	1136142	2	1	1	1
81	1137156	2	2	2	1
82	1143978	4	1	1	2
83	1143978	5	2	1	1
84	1147044	3	1	1	1
85	1147699	3	5	7	8
86	1147748	5	10	6	1
87	1148278	3	3	6	4
88	1148873	3	6	6	6
89	1152331	4	1	1	1
90	1155546	2	1	1	2
91	1156272	1	1	1	1
92	1156948	3	1	1	2
93	1157734	4	1	1	1
94	1158247	1	1	1	1
95	1160476	2	1	1	1
96	1164066	1	1	1	1
97	1165297	2	1	1	2
98	1165790	5	1	1	1
99	1165926	9	6	9	2
100	1166630	7	5	6	10
101	1166654	10	3	5	1
102	1167439	2	3	4	4
103	1167471	4	1	2	1
104	1168359	8	2	3	1
105	1168736	10	10	10	10
106	1169049	7	3	4	4
107	1170419	10	10	10	8
108	1170420	1	6	8	10
109	1171710	1	1	1	1
110	1171710	6	5	4	4
111	1171795	1	3	1	2
112	1171845	8	6	4	3
113	1172152	10	3	3	10
114	1173216	10	10	10	3
115	1173235	3	3	2	1
116	1173347	1	1	1	1
117	1173347	8	3	3	1
118	1173509	4	5	5	10
119	1173514	1	1	1	1

```
## 120  1173681              3              2              1              1
## 121  1174057              1              1              2              2
## 122  1174057              4              2              1              1
## 123  1174131             10             10             10              2
## 124  1174428              5              3              5              1
## 125  1175937              5              4              6              7
## 126  1176406              1              1              1              1
## 127  1176881              7              5              3              7
## 128  1177027              3              1              1              1
## 129  1177399              8              3              5              4
## 130  1177512              1              1              1              1
## 131  1178580              5              1              3              1
## 132  1179818              2              1              1              1
## 133  1180194              5             10              8             10
## 134  1180523              3              1              1              1
## 135  1180831              3              1              1              1
## 136  1181356              5              1              1              1
## 137  1182404              4              1              1              1
## 138  1182410              3              1              1              1
## 139  1183240              4              1              2              1
## 140  1183246              1              1              1              1
## 141  1183516              3              1              1              1
## 142  1183911              2              1              1              1
## 143  1183983              9              5              5              4
## 144  1184184              1              1              1              1
## 145  1184241              2              1              1              1
## 146  1184840              1              1              3              1
## 147  1185609              3              4              5              2
## 148  1185610              1              1              1              1
## 149  1187457              3              1              1              3
## 150  1187805              8              8              7              4
## 151  1188472              1              1              1              1
## 152  1189266              7              2              4              1
## 153  1189286             10             10              8              6
## 154  1190394              4              1              1              1
## 155  1190485              1              1              1              1
## 156  1192325              5              5              5              6
## 157  1193091              1              2              2              1
## 158  1193210              2              1              1              1
## 159  1193683              1              1              2              1
## 160  1196295              9              9             10              3
## 161  1196915             10              7              7              4
## 162  1197080              4              1              1              1
## 163  1197270              3              1              1              1
## 164  1197440              1              1              1              2
## 165  1197510              5              1              1              1
## 166  1197979              4              1              1              1
## 167  1197993              5              6              7              8
## 168  1198128             10              8             10             10
## 169  1198641              3              1              1              1
## 170  1199219              1              1              1              2
## 171  1199731              3              1              1              1
## 172  1199983              1              1              1              1
## 173  1200772              1              1              1              1
```

```
## 174  1200847              6              10              10              10
## 175  1200892              8               6               5               4
## 176  1200952              5               8               7               7
## 177  1201834              2               1               1               1
## 178  1201936              5              10              10               3
## 179  1202125              4               1               1               1
## 180  1202812              5               3               3               3
## 181  1203096              1               1               1               1
## 182  1204242              1               1               1               1
## 183  1204898              6               1               1               1
## 184  1205138              5               8               8               8
## 185  1205579              8               7               6               4
## 186  1206089              2               1               1               1
## 187  1206695              1               5               8               6
## 188  1206841             10               5               6              10
## 189  1207986              5               8               4              10
## 190  1208301              1               2               3               1
## 191  1210963             10              10              10               8
## 192  1211202              7               5              10              10
## 193  1212232              5               1               1               1
## 194  1212251              1               1               1               1
## 195  1212422              3               1               1               1
## 196  1212422              4               1               1               1
## 197  1213375              8               4               4               5
## 198  1213383              5               1               1               4
## 199  1214092              1               1               1               1
## 200  1214556              3               1               1               1
## 201  1214966              9               7               7               5
## 202  1216694             10               8               8               4
## 203  1216947              1               1               1               1
## 204  1217051              5               1               1               1
## 205  1217264              1               1               1               1
## 206  1218105              5              10              10               9
## 207  1218741             10              10               9               3
## 208  1218860              1               1               1               1
## 209  1218860              1               1               1               1
## 210  1219406              5               1               1               1
## 211  1219525              8              10              10              10
## 212  1219859              8              10               8               8
## 213  1220330              1               1               1               1
## 214  1221863             10              10              10              10
## 215  1222047             10              10              10              10
## 216  1222936              8               7               8               7
## 217  1223282              1               1               1               1
## 218  1223426              1               1               1               1
## 219  1223793              6              10               7               7
## 220  1223967              6               1               3               1
## 221  1224329              1               1               1               2
## 222  1225799             10               6               4               3
## 223  1226012              4               1               1               3
## 224  1226612              7               5               6               3
## 225  1227210             10               5               5               6
## 226  1227244              1               1               1               1
## 227  1227481             10               5               7               4
```

```
## 228  1228152              8              9              9              5
## 229  1228311              1              1              1              1
## 230  1230175             10             10             10              3
## 231  1230688              7              4              7              4
## 232  1231387              6              8              7              5
## 233  1231706              8              4              6              3
## 234  1232225             10              4              5              5
## 235  1236043              3              3              2              1
## 236  1241232              3              1              4              1
## 237  1241559             10              8              8              2
## 238  1241679              9              8              8              5
## 239  1242364              8             10             10              8
## 240  1243256             10              4              3              2
## 241  1270479              5              1              3              3
## 242  1276091              3              1              1              3
## 243  1277018              2              1              1              1
## 244   128059              1              1              1              1
## 245  1285531              1              1              1              1
## 246  1287775              5              1              1              2
## 247   144888              8             10             10              8
## 248   145447              8              4              4              1
## 249   167528              4              1              1              1
## 250   169356              3              1              1              1
## 251   183913              1              2              2              1
## 252   191250             10              4              4             10
## 253  1017023              6              3              3              5
## 254  1100524              6             10             10              2
## 255  1116116              9             10             10              1
## 256  1168736              5              6              6              2
## 257  1182404              3              1              1              1
## 258  1182404              3              1              1              1
## 259  1198641              3              1              1              1
## 260   242970              5              7              7              1
## 261   255644             10              5              8             10
## 262   263538              5             10             10              6
## 263   274137              8              8              9              4
## 264   303213             10              4              4             10
## 265   314428              7              9              4             10
## 266  1182404              5              1              4              1
## 267  1198641             10             10              6              3
## 268   320675              3              3              5              2
## 269   324427             10              8              8              2
## 270   385103              1              1              1              1
## 271   390840              8              4              7              1
## 272   411453              5              1              1              1
## 273   320675              3              3              5              2
## 274   428903              7              2              4              1
## 275   431495              3              1              1              1
## 276   432809              3              1              3              1
## 277   434518              3              1              1              1
## 278   452264              1              1              1              1
## 279   456282              1              1              1              1
## 280   476903             10              5              7              3
## 281   486283              3              1              1              1
```

```
## 282   486662            2            1            1            2
## 283   488173            1            4            3           10
## 284   492268           10            4            6            1
## 285   508234            7            4            5           10
## 286   527363            8           10           10           10
## 287   529329           10           10           10           10
## 288   535331            3            1            1            1
## 289   543558            6            1            3            1
## 290   555977            5            6            6            8
## 291   560680            1            1            1            1
## 292   561477            1            1            1            1
## 293   563649            8            8            8            1
## 294   601265           10            4            4            6
## 295   606140            1            1            1            1
## 296   606722            5            5            7            8
## 297   616240            5            3            4            3
## 298    61634            5            4            3            1
## 299   625201            8            2            1            1
## 300    63375            9            1            2            6
## 301   635844            8            4           10            5
## 302   636130            1            1            1            1
## 303   640744           10           10           10            7
## 304   646904            1            1            1            1
## 305   653777            8            3            4            9
## 306   659642           10            8            4            4
## 307   666090            1            1            1            1
## 308   666942            1            1            1            1
## 309   667204            7            8            7            6
## 310   673637            3            1            1            1
## 311   684955            2            1            1            1
## 312   688033            1            1            1            1
## 313   691628            8            6            4           10
## 314   693702            1            1            1            1
## 315   704097            1            1            1            1
## 316   704168            4            6            5            6
## 317   706426            5            5            5            2
## 318   709287            6            8            7            8
## 319   718641            1            1            1            1
## 320   721482            4            4            4            4
## 321   730881            7            6            3            2
## 322   733639            3            1            1            1
## 323   733639            3            1            1            1
## 324   733823            5            4            6           10
## 325   740492            1            1            1            1
## 326   743348            3            2            2            1
## 327   752904           10            1            1            1
## 328   756136            1            1            1            1
## 329   760001            8           10            3            2
## 330   760239           10            4            6            4
## 331    76389           10            4            7            2
## 332   764974            5            1            1            1
## 333   770066            5            2            2            2
## 334   785208            5            4            6            6
## 335   785615            8            6            7            3
```

```
## 336   792744            1            1            1            1
## 337   797327            6            5            5            8
## 338   798429            1            1            1            1
## 339   704097            1            1            1            1
## 340   806423            8            5            5            5
## 341   809912           10            3            3            1
## 342   810104            1            1            1            1
## 343   814265            2            1            1            1
## 344   814911            1            1            1            1
## 345   822829            7            6            4            8
## 346   826923            1            1            1            1
## 347   830690            5            2            2            2
## 348   831268            1            1            1            1
## 349   832226            3            4            4           10
## 350   832567            4            2            3            5
## 351   836433            5            1            1            3
## 352   837082            2            1            1            1
## 353   846832            3            4            5            3
## 354   850831            2            7           10           10
## 355   855524            1            1            1            1
## 356   857774            4            1            1            1
## 357   859164            5            3            3            1
## 358   859350            8           10           10            7
## 359   866325            8           10            5            3
## 360   873549           10            3            5            4
## 361   877291            6           10           10           10
## 362   877943            3           10            3           10
## 363   888169            3            2            2            1
## 364   888523            4            4            4            2
## 365   896404            2            1            1            1
## 366   897172            2            1            1            1
## 367    95719            6           10           10           10
## 368   160296            5            8            8           10
## 369   342245            1            1            3            1
## 370   428598            1            1            3            1
## 371   492561            4            3            2            1
## 372   493452            1            1            3            1
## 373   493452            4            1            2            1
## 374   521441            5            1            1            2
## 375   560680            3            1            2            1
## 376   636437            1            1            1            1
## 377   640712            1            1            1            1
## 378   654244            1            1            1            1
## 379   657753            3            1            1            4
## 380   685977            5            3            4            1
## 381   805448            1            1            1            1
## 382   846423           10            6            3            6
## 383  1002504            3            2            2            2
## 384  1022257            2            1            1            1
## 385  1026122            2            1            1            1
## 386  1071084            3            3            2            2
## 387  1080233            7            6            6            3
## 388  1114570            5            3            3            2
## 389  1114570            2            1            1            1
```

```
## 390  1116715     5     1     1     1
## 391  1131411     1     1     1     2
## 392  1151734    10     8     7     4
## 393  1156017     3     1     1     1
## 394  1158247     1     1     1     1
## 395  1158405     1     2     3     1
## 396  1168278     3     1     1     1
## 397  1176187     3     1     1     1
## 398  1196263     4     1     1     1
## 399  1196475     3     2     1     1
## 400  1206314     1     2     3     1
## 401  1211265     3    10     8     7
## 402  1213784     3     1     1     1
## 403  1223003     5     3     3     1
## 404  1223306     3     1     1     1
## 405  1223543     1     2     1     3
## 406  1229929     1     1     1     1
## 407  1231853     4     2     2     1
## 408  1234554     1     1     1     1
## 409  1236837     2     3     2     2
## 410  1237674     3     1     2     1
## 411  1238021     1     1     1     1
## 412  1238464     1     1     1     1
## 413  1238633    10    10    10     6
## 414  1238915     5     1     2     1
## 415  1238948     8     5     6     2
## 416  1239232     3     3     2     6
## 417  1239347     8     7     8     5
## 418  1239967     1     1     1     1
## 419  1240337     5     2     2     2
## 420  1253505     2     3     1     1
## 421  1255384     3     2     2     3
## 422  1257200    10    10    10     7
## 423  1257648     4     3     3     1
## 424  1257815     5     1     3     1
## 425  1257938     3     1     1     1
## 426  1258549     9    10    10    10
## 427  1258556     5     3     6     1
## 428  1266154     8     7     8     2
## 429  1272039     1     1     1     1
## 430  1276091     2     1     1     1
## 431  1276091     1     3     1     1
## 432  1276091     5     1     1     3
## 433  1277629     5     1     1     1
## 434  1293439     3     2     2     3
## 435  1293439     6     9     7     5
## 436  1294562    10     8    10     1
## 437  1295186    10    10    10     1
## 438   527337     4     1     1     1
## 439   558538     4     1     3     3
## 440   566509     5     1     1     1
## 441   608157    10     4     3    10
## 442   677910     5     2     2     4
## 443   734111     1     1     1     3
```

```
## 444   734111             1             1             1             1
## 445   780555             5             1             1             6
## 446   827627             2             1             1             1
## 447  1049837             1             1             1             1
## 448  1058849             5             1             1             1
## 449  1182404             1             1             1             1
## 450  1193544             5             7             9             8
## 451  1201870             4             1             1             3
## 452  1202253             5             1             1             1
## 453  1227081             3             1             1             3
## 454  1230994             4             5             5             8
## 455  1238410             2             3             1             1
## 456  1246562            10             2             2             1
## 457  1257470            10             6             5             8
## 458  1259008             8             8             9             6
## 459  1266124             5             1             2             1
## 460  1267898             5             1             3             1
## 461  1268313             5             1             1             3
## 462  1268804             3             1             1             1
## 463  1276091             6             1             1             3
## 464  1280258             4             1             1             1
## 465  1293966             4             1             1             1
## 466  1296572            10             9             8             7
## 467  1298416            10             6             6             2
## 468  1299596             6             6             6             5
## 469  1105524             4             1             1             1
## 470  1181685             1             1             2             1
## 471  1211594             3             1             1             1
## 472  1238777             6             1             1             3
## 473  1257608             6             1             1             1
## 474  1269574             4             1             1             1
## 475  1277145             5             1             1             1
## 476  1287282             3             1             1             1
## 477  1296025             4             1             2             1
## 478  1296263             4             1             1             1
## 479  1296593             5             2             1             1
## 480  1299161             4             8             7            10
## 481  1301945             5             1             1             1
## 482  1302428             5             3             2             4
## 483  1318169             9            10            10            10
## 484   474162             8             7             8             5
## 485   787451             5             1             2             1
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## 487  1070522             3             1             1             1
## 488  1073960            10            10            10            10
## 489  1076352             3             6             4            10
## 490  1084139             6             3             2             1
## 491  1115293             1             1             1             1
## 492  1119189             5             8             9             4
## 493  1133991             4             1             1             1
## 494  1142706             5            10            10            10
## 495  1155967             5             1             2            10
## 496  1170945             3             1             1             1
## 497  1181567             1             1             1             1
```

```
## 498  1182404              4              2              1              1
## 499  1204558              4              1              1              1
## 500  1217952              4              1              1              1
## 501  1224565              6              1              1              1
## 502  1238186              4              1              1              1
## 503  1253917              4              1              1              2
## 504  1265899              4              1              1              1
## 505  1268766              1              1              1              1
## 506  1277268              3              3              1              1
## 507  1286943              8             10             10             10
## 508  1295508              1              1              1              1
## 509  1297327              5              1              1              1
## 510  1297522              2              1              1              1
## 511  1298360              1              1              1              1
## 512  1299924              5              1              1              1
## 513  1299994              5              1              1              1
## 514  1304595              3              1              1              1
## 515  1306282              6              6              7             10
## 516  1313325              4             10              4              7
## 517  1320077              1              1              1              1
## 518  1320077              1              1              1              1
## 519  1320304              3              1              2              2
## 520  1330439              4              7              8              3
## 521   333093              1              1              1              1
## 522   369565              4              1              1              1
## 523   412300             10              4              5              4
## 524   672113              7              5              6             10
## 525   749653              3              1              1              1
## 526   769612              3              1              1              2
## 527   769612              4              1              1              1
## 528   798429              4              1              1              1
## 529   807657              6              1              3              2
## 530  8233704              4              1              1              1
## 531   837480              7              4              4              3
## 532   867392              4              2              2              1
## 533   869828              1              1              1              1
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## 535  1056171              2              1              1              1
## 536  1061990              1              1              3              2
## 537  1113061              5              1              1              1
## 538  1116192              5              1              2              1
## 539  1135090              4              1              1              1
## 540  1145420              6              1              1              1
## 541  1158157              5              1              1              1
## 542  1171578              3              1              1              1
## 543  1174841              5              3              1              1
## 544  1184586              4              1              1              1
## 545  1186936              2              1              3              2
## 546  1197527              5              1              1              1
## 547  1222464              6             10             10             10
## 548  1240603              2              1              1              1
## 549  1240603              3              1              1              1
## 550  1241035              7              8              3              7
## 551  1287971              3              1              1              1
```

```
## 552  1289391              1              1              1              1
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## 554  1306339              4              4              2              1
## 555  1313658              3              1              1              1
## 556  1313982              4              3              1              1
## 557  1321264              5              2              2              2
## 558  1321321              5              1              1              3
## 559  1321348              2              1              1              1
## 560  1321931              5              1              1              1
## 561  1321942              5              1              1              1
## 562  1321942              5              1              1              1
## 563  1328331              1              1              1              1
## 564  1328755              3              1              1              1
## 565  1331405              4              1              1              1
## 566  1331412              5              7             10             10
## 567  1333104              3              1              2              1
## 568  1334071              4              1              1              1
## 569  1343068              8              4              4              1
## 570  1343374             10             10              8             10
## 571  1344121              8             10              4              4
## 572   142932              7              6             10              5
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## 575   378275             10              9              7              3
## 576   385103              5              1              2              1
## 577   690557              5              1              1              1
## 578   695091              1              1              1              1
## 579   695219              1              1              1              1
## 580   824249              1              1              1              1
## 581   871549              5              1              2              1
## 582   878358              5              7             10              6
## 583  1107684              6             10              5              5
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## 585  1217717              5              1              1              6
## 586  1239420              1              1              1              1
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## 588  1261751              5              1              1              1
## 589  1268275              9              8              8              9
## 590  1272166              5              1              1              1
## 591  1294261              4             10              8              5
## 592  1295529              2              5              7              6
## 593  1298484             10              3              4              5
## 594  1311875              5              1              2              1
## 595  1315506              4              8              6              3
## 596  1320141              5              1              1              1
## 597  1325309              4              1              2              1
## 598  1333063              5              1              3              1
## 599  1333495              3              1              1              1
## 600  1334659              5              2              4              1
## 601  1336798              3              1              1              1
## 602  1344449              1              1              1              1
## 603  1350568              4              1              1              1
## 604  1352663              5              4              6              8
## 605   188336              5              3              2              8
```

606	352431	10	5	10	3
607	353098	4	1	1	2
608	411453	1	1	1	1
609	557583	5	10	10	10
610	636375	5	1	1	1
611	736150	10	4	3	10
612	803531	5	10	10	10
613	822829	8	10	10	10
614	1016634	2	3	1	1
615	1031608	2	1	1	1
616	1041043	4	1	3	1
617	1042252	3	1	1	1
618	1057067	1	1	1	1
619	1061990	4	1	1	1
620	1073836	5	1	1	1
621	1083817	3	1	1	1
622	1096352	6	3	3	3
623	1140597	7	1	2	3
624	1149548	1	1	1	1
625	1174009	5	1	1	2
626	1183596	3	1	3	1
627	1190386	4	6	6	5
628	1190546	2	1	1	1
629	1213273	2	1	1	1
630	1218982	4	1	1	1
631	1225382	6	2	3	1
632	1235807	5	1	1	1
633	1238777	1	1	1	1
634	1253955	8	7	4	4
635	1257366	3	1	1	1
636	1260659	3	1	4	1
637	1268952	10	10	7	8
638	1275807	4	2	4	3
639	1277792	4	1	1	1
640	1277792	5	1	1	3
641	1285722	4	1	1	3
642	1288608	3	1	1	1
643	1290203	3	1	1	1
644	1294413	1	1	1	1
645	1299596	2	1	1	1
646	1303489	3	1	1	1
647	1311033	1	2	2	1
648	1311108	1	1	1	3
649	1315807	5	10	10	10
650	1318671	3	1	1	1
651	1319609	3	1	1	2
652	1323477	1	2	1	3
653	1324572	5	1	1	1
654	1324681	4	1	1	1
655	1325159	3	1	1	1
656	1326892	3	1	1	1
657	1330361	5	1	1	1
658	1333877	5	4	5	1
659	1334015	7	8	8	7

```
## 660  1334667              1              1               1               1
## 661  1339781              1              1               1               1
## 662  1339781              4              1               1               1
## 663 13454352              1              1               3               1
## 664  1345452              1              1               3               1
## 665  1345593              3              1               1               3
## 666  1347749              1              1               1               1
## 667  1347943              5              2               2               2
## 668  1348851              3              1               1               1
## 669  1350319              5              7               4               1
## 670  1350423              5             10              10               8
## 671  1352848              3             10               7               8
## 672  1353092              3              2               1               2
## 673  1354840              2              1               1               1
## 674  1354840              5              3               2               1
## 675  1355260              1              1               1               1
## 676  1365075              4              1               4               1
## 677  1365328              1              1               2               1
## 678  1368267              5              1               1               1
## 679  1368273              1              1               1               1
## 680  1368882              2              1               1               1
## 681  1369821             10             10              10              10
## 682  1371026              5             10              10              10
## 683  1371920              5              1               1               1
## 684   466906              1              1               1               1
## 685   466906              1              1               1               1
## 686   534555              1              1               1               1
## 687   536708              1              1               1               1
## 688   566346              3              1               1               1
## 689   603148              4              1               1               1
## 690   654546              1              1               1               1
## 691   654546              1              1               1               3
## 692   695091              5             10              10               5
## 693   714039              3              1               1               1
## 694   763235              3              1               1               1
## 695   776715              3              1               1               1
## 696   841769              2              1               1               1
## 697   888820              5             10              10               3
## 698   897471              4              8               6               4
## 699   897471              4              8               8               5
##     epithelial_size bare_nucleoli bland_chromatin normal_nucleoli mitoses class
## 1                 2             1               3               1       1     2
## 2                 7            10               3               2       1     2
## 3                 2             2               3               1       1     2
## 4                 3             4               3               7       1     2
## 5                 2             1               3               1       1     2
## 6                 7            10               9               7       1     4
## 7                 2            10               3               1       1     2
## 8                 2             1               3               1       1     2
## 9                 2             1               1               1       5     2
## 10                2             1               2               1       1     2
## 11                1             1               3               1       1     2
## 12                2             1               2               1       1     2
## 13                2             3               4               4       1     4
```

```
## 14      2      3      3      1     1     2
## 15      7      9      5      5     4     4
## 16      6      1      4      3     1     4
## 17      2      1      2      1     1     2
## 18      2      1      3      1     1     2
## 19      4     10      4      1     2     4
## 20      2      1      3      1     1     2
## 21      5     10      5      4     4     4
## 22      6      7      7     10     1     4
## 23      2      1      2      1     1     2
## 24      2   <NA>      7      3     1     4
## 25      2      1      3      1     1     2
## 26      2      7      3      6     1     4
## 27      1      1      2      1     1     2
## 28      2      1      2      1     1     2
## 29      2      1      2      1     1     2
## 30      2      1      1      1     1     2
## 31      1      1      2      1     1     2
## 32      2      1      3      1     1     2
## 33      8      5      7      4     3     4
## 34      2      1      3      1     1     2
## 35      2      1      2      1     1     2
## 36      2      1      2      1     1     2
## 37      6      1      8      9     1     4
## 38      1      1      7      1     1     2
## 39      2     10      5      6     1     4
## 40      6      7      7      5     1     4
## 41      6   <NA>      7      8     1     2
## 42      3      3      6      5     2     4
## 43      8     10      7      3     3     4
## 44     10      1      3      1     1     4
## 45      8      1      8     10     1     4
## 46      2      1      2      1     2     2
## 47      4      9      4      8     1     4
## 48      2      1      2      1     1     2
## 49      2      1      3      1     1     2
## 50      4      8      3      8     2     4
## 51      2      3      2      1     5     4
## 52      2      4      3      4     1     4
## 53      3      5      4     10     2     4
## 54     10      8      7      3     7     4
## 55      8      8      7      1     1     4
## 56      4      5      3      6     1     4
## 57      3      6      3      9     1     4
## 58      5      1      5      4     4     4
## 59      6     10      5      1     1     4
## 60      2      2      5      1     1     4
## 61      3      3      4     10     1     4
## 62      2      2      2      1     1     2
## 63     10      8      3      3     1     4
## 64      5      2      3      9     1     4
## 65      2      1      2      1     1     2
## 66      3      2      4      3    10     4
## 67      2      1      3      1     1     2
```

```
## 68    8   10   4   9   1   4
## 69    4    9   8   9   8   4
## 70    2    1   3   2   1   2
## 71    2    1   2   1   1   2
## 72   10    2   7   8  10   4
## 73    2    1   7   2   1   2
## 74    6   10   4   8   1   4
## 75    3    4   3   2   3   4
## 76    2    2   4   2   1   2
## 77    2    1   2   1   1   2
## 78    2    1   2   1   1   2
## 79    2    3   3   1   1   2
## 80    3    1   2   1   1   2
## 81    1    1   7   1   1   2
## 82    2    1   2   1   1   2
## 83    2    1   3   1   1   2
## 84    2    2   7   1   1   2
## 85    8    9   7  10   7   4
## 86   10    4   4  10  10   4
## 87    5    8   4   4   1   4
## 88    5   10   6   8   3   4
## 89    2    1   3   1   1   2
## 90    3    1   2   1   1   2
## 91    2    1   3   1   1   2
## 92    2    1   1   1   1   2
## 93    2    1   3   1   1   2
## 94    2    1   2   1   1   2
## 95    2    1   3   1   1   2
## 96    2    1   3   1   1   2
## 97    2    1   1   1   1   2
## 98    2    1   3   1   1   2
## 99   10    6   2   9  10   4
## 100   5   10   7   9   4   4
## 101  10    5   3  10   2   4
## 102   2    5   2   5   1   4
## 103   2    1   3   1   1   2
## 104   6    3   7   1   1   4
## 105  10    1   8   8   8   4
## 106   3    3   3   2   7   4
## 107   2   10   4   1   1   4
## 108   8   10   5   7   1   4
## 109   2    1   2   3   1   2
## 110   3    9   7   8   3   4
## 111   2    2   5   3   2   2
## 112   5    9   3   1   1   4
## 113   2   10   7   3   3   4
## 114  10    8   8   1   1   4
## 115   2    3   3   1   1   2
## 116   2    5   1   1   1   2
## 117   2    2   3   2   1   2
## 118   4   10   7   5   8   4
## 119   4    3   1   1   1   2
## 120   2    2   3   1   1   2
## 121   2    1   3   1   1   2
```

```
## 122     2      2      3      1     1     2
## 123    10     10      5      3     3     4
## 124     8     10      5      3     1     4
## 125     9      7      8     10     1     4
## 126     2      1      2      1     1     2
## 127     4     10      7      5     5     4
## 128     2      1      3      1     1     2
## 129     5     10      1      6     2     4
## 130    10      1      1      1     1     2
## 131     2      1      2      1     1     2
## 132     2      1      3      1     1     2
## 133     8     10      3      6     3     4
## 134     2      1      2      2     1     2
## 135     3      1      2      1     1     2
## 136     2      2      3      3     1     2
## 137     2      1      2      1     1     2
## 138     2      1      1      1     1     2
## 139     2      1      2      1     1     2
## 140     1   <NA>      2      1     1     2
## 141     2      1      1      1     1     2
## 142     2      1      1      1     1     2
## 143     4      5      4      3     3     4
## 144     2      5      1      1     1     2
## 145     2      1      2      1     1     2
## 146     2   <NA>      2      1     1     2
## 147     6      8      4      1     1     4
## 148     3      2      2      1     1     2
## 149     8      1      5      8     1     2
## 150    10     10      7      8     7     4
## 151     1      1      3      1     1     2
## 152     6     10      5      4     3     4
## 153     4      5      8     10     1     4
## 154     2      3      1      1     1     2
## 155     2      1      1      1     1     2
## 156     3     10      3      1     1     4
## 157     2      1      2      1     1     2
## 158     2      1      3      1     1     2
## 159     3   <NA>      1      1     1     2
## 160     6     10      7     10     6     4
## 161     5     10      5      7     2     4
## 162     2      1      3      2     1     2
## 163     2      1      3      1     1     2
## 164     1      3      1      1     7     2
## 165     2   <NA>      3      1     1     2
## 166     2      2      3      2     1     2
## 167     8     10      3     10     3     4
## 168     6      1      3      1    10     4
## 169     2      1      3      1     1     2
## 170     1      1      1      1     1     2
## 171     2      1      1      1     1     2
## 172     2      1      3      1     1     2
## 173     2      1      2      1     1     2
## 174     8     10     10     10     7     4
## 175     3     10      6      1     1     4
```

```
## 176  10  10   5   7   1   4
## 177   2   1   3   1   1   2
## 178   8   1   5  10   3   4
## 179   2   1   3   1   1   2
## 180   6  10   3   1   1   4
## 181   1   1   3   1   1   2
## 182   2   1   1   1   1   2
## 183   2   1   3   1   1   2
## 184   5  10   7   8   1   4
## 185   4  10   5   1   1   4
## 186   1   1   3   1   1   2
## 187   5   8   7  10   1   4
## 188   6  10   7   7  10   4
## 189   5   8   9  10   1   4
## 190   2   1   3   1   1   2
## 191   6   8   7  10   1   4
## 192  10  10   4  10   3   4
## 193   2   1   2   1   1   2
## 194   2   1   3   1   1   2
## 195   2   1   3   1   1   2
## 196   2   1   3   1   1   2
## 197   4   7   7   8   2   2
## 198   2   1   3   1   1   2
## 199   2   1   1   1   1   2
## 200   2   1   2   1   1   2
## 201   5  10   7   8   3   4
## 202  10  10   8   1   1   4
## 203   2   1   3   1   1   2
## 204   2   1   3   1   1   2
## 205   2   1   3   1   1   2
## 206   6  10   7  10   5   4
## 207   7   5   3   5   1   4
## 208   1   1   3   1   1   2
## 209   1   1   3   1   1   2
## 210   1   1   3   1   1   2
## 211   5  10   8  10   6   4
## 212   4   8   7   7   1   4
## 213   2   1   3   1   1   2
## 214   7  10   7  10   4   4
## 215   3  10  10   6   1   4
## 216   5   5   5  10   2   4
## 217   2   1   2   1   1   2
## 218   2   1   3   1   1   2
## 219   6   4   8  10   2   4
## 220   2   1   3   1   1   2
## 221   2   1   3   1   1   2
## 222  10  10   9  10   1   4
## 223   1   5   2   1   1   4
## 224   3   8   7   4   1   4
## 225   3  10   7   9   2   4
## 226   2   1   2   1   1   2
## 227   4  10   8   9   1   4
## 228   3   5   7   7   1   4
## 229   1   1   3   1   1   2
```

## 230	10	10	9	10	1	4
## 231	3	7	7	6	1	4
## 232	6	8	8	9	2	4
## 233	3	1	4	3	1	2
## 234	5	10	4	1	1	4
## 235	3	1	3	6	1	2
## 236	2	<NA>	3	1	1	2
## 237	8	10	4	8	10	4
## 238	6	2	4	10	4	4
## 239	6	9	3	10	10	4
## 240	3	10	5	3	2	4
## 241	2	2	2	3	1	2
## 242	1	1	3	1	1	2
## 243	2	1	3	1	1	2
## 244	2	5	5	1	1	2
## 245	2	1	3	1	1	2
## 246	2	2	3	1	1	2
## 247	5	10	7	8	1	4
## 248	2	9	3	3	1	4
## 249	2	1	3	6	1	2
## 250	2	<NA>	3	1	1	2
## 251	2	1	1	1	1	2
## 252	2	10	5	3	3	4
## 253	3	10	3	5	3	2
## 254	8	10	7	3	3	4
## 255	10	8	3	3	1	4
## 256	4	10	3	6	1	4
## 257	2	1	1	1	1	2
## 258	2	1	2	1	1	2
## 259	2	1	3	1	1	2
## 260	5	8	3	4	1	2
## 261	3	10	5	1	3	4
## 262	10	10	10	6	5	4
## 263	5	10	7	8	1	4
## 264	6	10	5	5	1	4
## 265	10	3	5	3	3	4
## 266	2	1	3	2	1	2
## 267	3	10	4	3	2	4
## 268	3	10	7	1	1	4
## 269	3	4	8	7	8	4
## 270	2	1	3	1	1	2
## 271	3	10	3	9	2	4
## 272	2	1	3	1	1	2
## 273	3	10	7	1	1	4
## 274	3	4	3	3	1	4
## 275	2	1	3	2	1	2
## 276	2	<NA>	2	1	1	2
## 277	2	1	2	1	1	2
## 278	2	1	2	1	1	2
## 279	2	1	3	1	1	2
## 280	3	7	3	3	8	4
## 281	2	1	3	1	1	2
## 282	2	1	3	1	1	2
## 283	4	10	5	6	1	4

```
## 284      2      10      5      3     1     4
## 285      2      10      3      8     2     4
## 286      8      10     10      7     3     4
## 287     10      10      4     10    10     4
## 288      3       1      2      1     1     2
## 289      4       5      5     10     1     4
## 290      6      10      4     10     4     4
## 291      2       1      1      1     1     2
## 292      2       1      3      1     1     2
## 293      2    <NA>      6     10     1     4
## 294      2      10      2      3     1     4
## 295      2    <NA>      2      1     1     2
## 296      6      10      7      4     1     4
## 297      4       5      4      7     1     2
## 298      2    <NA>      2      3     1     2
## 299      5       1      1      1     1     2
## 300      4      10      7      7     2     4
## 301      4       4      7     10     1     4
## 302      2       1      3      1     1     2
## 303      9      10      7     10    10     4
## 304      2       1      3      1     1     2
## 305      3      10      3      3     1     4
## 306      4      10      3     10     4     4
## 307      2       1      3      1     1     2
## 308      2       1      3      1     1     2
## 309      4       3      8      8     4     4
## 310      2       5      5      1     1     2
## 311      3       1      2      1     1     2
## 312      2       1      1      1     1     2
## 313     10       1      3      5     1     4
## 314      2       1      1      1     1     2
## 315      1       1      2      1     1     2
## 316      7    <NA>      4      9     1     2
## 317      5      10      4      3     1     4
## 318      6       8      8      9     1     4
## 319      5       1      3      1     1     2
## 320      6       5      7      3     1     2
## 321      5      10      7      4     6     4
## 322      2    <NA>      3      1     1     2
## 323      2       1      3      1     1     2
## 324      2      10      4      1     1     4
## 325      2       1      3      1     1     2
## 326      2       1      2      3     1     2
## 327      2      10      5      4     1     4
## 328      2       1      2      1     1     2
## 329      6       4      3     10     1     4
## 330      5      10      7      1     1     4
## 331      2       8      6      1     1     4
## 332      2       1      3      1     2     2
## 333      2       1      2      2     1     2
## 334      4      10      4      3     1     4
## 335      3      10      3      4     2     4
## 336      2       1      1      1     1     2
## 337      4      10      3      4     1     4
```

## 338	2	1	3	1	1	2
## 339	1	1	2	1	1	2
## 340	2	10	4	3	1	4
## 341	2	10	7	6	1	4
## 342	2	1	3	1	1	2
## 343	2	1	1	1	1	2
## 344	2	1	1	1	1	2
## 345	10	10	9	5	3	4
## 346	2	1	1	1	1	2
## 347	3	1	1	3	1	2
## 348	1	1	1	3	1	2
## 349	5	1	3	3	1	4
## 350	3	8	7	6	1	4
## 351	2	1	1	1	1	2
## 352	2	1	3	1	1	2
## 353	7	3	4	6	1	2
## 354	7	10	4	9	4	4
## 355	2	1	2	1	1	2
## 356	3	1	2	2	1	2
## 357	3	3	3	3	3	4
## 358	10	10	7	3	8	4
## 359	8	4	4	10	3	4
## 360	3	7	3	5	3	4
## 361	10	10	8	10	10	4
## 362	6	10	5	1	4	4
## 363	4	3	2	1	1	2
## 364	2	3	2	1	1	2
## 365	2	1	3	1	1	2
## 366	2	1	2	1	1	2
## 367	8	10	7	10	7	4
## 368	5	10	8	10	3	4
## 369	2	1	1	1	1	2
## 370	1	1	2	1	1	2
## 371	3	1	2	1	1	2
## 372	2	1	1	1	1	2
## 373	2	1	2	1	1	2
## 374	2	1	2	1	1	2
## 375	2	1	2	1	1	2
## 376	2	1	1	1	1	2
## 377	2	1	2	1	1	2
## 378	1	1	2	1	1	2
## 379	3	1	2	2	1	2
## 380	4	1	3	1	1	2
## 381	2	1	1	1	1	2
## 382	4	10	7	8	4	4
## 383	2	1	3	2	1	2
## 384	2	1	1	1	1	2
## 385	2	1	1	1	1	2
## 386	3	1	1	2	3	2
## 387	2	10	7	1	1	4
## 388	3	1	3	1	1	2
## 389	2	1	2	2	1	2
## 390	3	2	2	2	1	2
## 391	2	1	2	1	1	2

```
## 392      3      10       7       9     1     4
## 393      2       1       2       1     1     2
## 394      1       1       1       1     1     2
## 395      2       1       2       1     1     2
## 396      2       1       2       1     1     2
## 397      2       1       3       1     1     2
## 398      2       1       1       1     1     2
## 399      2       1       2       2     1     2
## 400      2       1       1       1     1     2
## 401      6       9       9       3     8     4
## 402      2       1       1       1     1     2
## 403      2       1       2       1     1     2
## 404      2       4       1       1     1     2
## 405      2       1       1       2     1     2
## 406      2       1       2       1     1     2
## 407      2       1       2       1     1     2
## 408      2       1       2       1     1     2
## 409      2       2       3       1     1     2
## 410      2       1       2       1     1     2
## 411      2       1       2       1     1     2
## 412      1    <NA>       2       1     1     2
## 413      8       4       8       5     1     4
## 414      2       1       3       1     1     2
## 415      3      10       6       6     1     4
## 416      3       3       3       5     1     2
## 417     10      10       7       2     1     4
## 418      2       1       2       1     1     2
## 419      2       2       3       2     2     2
## 420      5       1       1       1     1     2
## 421      2       3       3       1     1     2
## 422     10      10       8       2     1     4
## 423      2       1       3       3     1     2
## 424      2       1       2       1     1     2
## 425      2       1       1       1     1     2
## 426     10      10      10      10     1     4
## 427      2       1       1       1     1     2
## 428      4       2       5      10     1     4
## 429      2       1       2       1     1     2
## 430      2       1       2       1     1     2
## 431      2       1       2       2     1     2
## 432      4       1       3       2     1     2
## 433      2       1       2       2     1     2
## 434      2       1       1       1     1     2
## 435      5       8       4       2     1     2
## 436      3      10       5       1     1     4
## 437      6       1       2       8     1     4
## 438      2       1       1       1     1     2
## 439      2       1       1       1     1     2
## 440      2       1       1       1     1     2
## 441      4      10      10       1     1     4
## 442      2       4       1       1     1     2
## 443      2       3       1       1     1     2
## 444      2       2       1       1     1     2
## 445      3       1       2       1     1     2
```

```
## 446   2   1   1   1   1   2
## 447   2   1   1   1   1   2
## 448   2   1   1   1   1   2
## 449   1   1   1   1   1   2
## 450   6  10   8  10   1   4
## 451   1   1   2   1   1   2
## 452   2   1   1   1   1   2
## 453   2   1   1   1   1   2
## 454   6  10  10   7   1   4
## 455   3   1   1   1   1   2
## 456   2   6   1   1   2   4
## 457   5  10   8   6   1   4
## 458   6   3  10  10   1   4
## 459   2   1   1   1   1   2
## 460   2   1   1   1   1   2
## 461   2   1   1   1   1   2
## 462   2   5   1   1   1   2
## 463   2   1   1   1   1   2
## 464   2   1   1   2   1   2
## 465   2   1   1   1   1   2
## 466   6   4   7  10   3   4
## 467   4  10   9   7   1   4
## 468   4  10   7   6   2   4
## 469   2   1   1   1   1   2
## 470   2   1   2   1   1   2
## 471   1   1   2   1   1   2
## 472   2   1   1   1   1   2
## 473   1   1   1   1   1   2
## 474   2   1   1   1   1   2
## 475   2   1   1   1   1   2
## 476   2   1   1   1   1   2
## 477   2   1   1   1   1   2
## 478   2   1   1   1   1   2
## 479   2   1   1   1   1   2
## 480   4  10   7   5   1   4
## 481   1   1   1   1   1   2
## 482   2   1   1   1   1   2
## 483  10   5  10  10  10   4
## 484   5  10   9  10   1   4
## 485   2   1   1   1   1   2
## 486   1   3   1   1   1   2
## 487   1   1   2   1   1   2
## 488   6  10   8   1   5   4
## 489   3   3   3   4   1   4
## 490   3   4   4   1   1   4
## 491   2   1   1   1   1   2
## 492   3  10   7   1   1   4
## 493   1   1   2   1   1   2
## 494   6  10   6   5   2   4
## 495   4   5   2   1   1   2
## 496   1   1   2   1   1   2
## 497   1   1   1   1   1   2
## 498   2   1   1   1   1   2
## 499   2   1   2   1   1   2
```

```
## 500  2  1  2  1  1  2
## 501  2  1  3  1  1  2
## 502  2  1  2  1  1  2
## 503  2  1  2  1  1  2
## 504  2  1  3  1  1  2
## 505  2  1  1  1  1  2
## 506  2  1  1  1  1  2
## 507  7  5  4  8  7  4
## 508  2  4  1  1  1  2
## 509  2  1  1  1  1  2
## 510  2  1  1  1  1  2
## 511  2  1  1  1  1  2
## 512  2  1  2  1  1  2
## 513  2  1  1  1  1  2
## 514  1  1  2  1  1  2
## 515  3  10  8  10  2  4
## 516  3  10  9  10  1  4
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## 518  1  1  2  1  1  2
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## 520  4  10  9  1  1  4
## 521  3  1  1  1  1  2
## 522  3  1  1  1  1  2
## 523  3  5  7  3  1  4
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## 529  2  1  1  1  1  2
## 530  1  1  2  1  1  2
## 531  4  10  6  9  1  4
## 532  2  1  2  1  1  2
## 533  1  1  3  1  1  2
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## 536  2  1  3  1  1  2
## 537  2  1  3  1  1  2
## 538  2  1  3  1  1  2
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## 543  2  1  1  1  1  2
## 544  2  1  2  1  1  2
## 545  2  1  2  1  1  2
## 546  2  1  2  1  1  2
## 547  4  10  7  10  1  4
## 548  1  1  1  1  1  2
## 549  1  1  1  1  1  2
## 550  4  5  7  8  2  4
## 551  2  1  2  1  1  2
## 552  2  1  3  1  1  2
## 553  2  1  4  2  1  2
```

```
## 554     2     5     2     1     2     2
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## 559     2     1     2     1     1     2
## 560     2     1     2     1     1     2
## 561     2     1     3     1     1     2
## 562     2     1     3     1     1     2
## 563     2     1     3     1     1     2
## 564     2     1     2     1     1     2
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## 566     5    10    10    10     1     4
## 567     2     1     3     1     1     2
## 568     2     3     2     1     1     2
## 569     6    10     2     5     2     4
## 570     6     5    10     3     1     4
## 571     8    10     8     2     1     4
## 572     3    10     9    10     2     4
## 573     2     1     2     1     1     2
## 574     2     1     2     1     1     2
## 575     4     2     7     7     1     4
## 576     2     1     3     1     1     2
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## 580     2     1     3     1     1     2
## 581     2     1     2     1     1     2
## 582     5    10     7     5     1     4
## 583     4    10     6    10     1     4
## 584     2     1     1     1     1     2
## 585     3     1     1     1     1     2
## 586     2     1     1     1     1     2
## 587     6    10    10    10     1     4
## 588     2     1     2     2     1     2
## 589     6     3     4     1     1     4
## 590     2     1     1     1     1     2
## 591     4     1    10     1     1     4
## 592     4    10     7     6     1     4
## 593     3    10     4     1     1     4
## 594     2     1     1     1     1     2
## 595     4    10     7     1     1     4
## 596     2     1     2     1     1     2
## 597     2     1     2     1     1     2
## 598     2     1     3     1     1     2
## 599     2     1     2     1     1     2
## 600     1     1     1     1     1     2
## 601     2     1     2     1     1     2
## 602     1     1     2     1     1     2
## 603     2     1     2     1     1     2
## 604     4     1     8    10     1     4
## 605     5    10     8     1     2     4
## 606     5     8     7     8     3     4
## 607     2     1     1     1     1     2
```

```
## 608   2   1   1   1   1   2
## 609  10  10  10   1   1   4
## 610   2   1   1   1   1   2
## 611   3  10   7   1   2   4
## 612   5   2   8   5   1   4
## 613   6  10  10  10  10   4
## 614   2   1   2   1   1   2
## 615   1   1   2   1   1   2
## 616   2   1   2   1   1   2
## 617   2   1   2   1   1   2
## 618   1   ?   1   1   1   2
## 619   2   1   2   1   1   2
## 620   2   1   2   1   1   2
## 621   2   1   2   1   1   2
## 622   3   2   6   1   1   2
## 623   2   1   2   1   1   2
## 624   2   1   1   1   1   2
## 625   1   1   2   1   1   2
## 626   3   4   1   1   1   2
## 627   7   6   7   7   3   4
## 628   2   5   1   1   1   2
## 629   2   1   1   1   1   2
## 630   2   1   1   1   1   2
## 631   2   1   1   1   1   2
## 632   2   1   2   1   1   2
## 633   2   1   1   1   1   2
## 634   5   3   5  10   1   4
## 635   2   1   1   1   1   2
## 636   2   1   1   1   1   2
## 637   7   1  10  10   3   4
## 638   2   2   2   1   1   2
## 639   2   1   1   1   1   2
## 640   2   1   1   1   1   2
## 641   2   1   1   1   1   2
## 642   2   1   2   1   1   2
## 643   2   1   2   1   1   2
## 644   2   1   1   1   1   2
## 645   2   1   1   1   1   2
## 646   2   1   2   1   1   2
## 647   2   1   1   1   1   2
## 648   2   1   1   1   1   2
## 649  10   2  10  10  10   4
## 650   2   1   2   1   1   2
## 651   3   4   1   1   1   2
## 652   2   1   2   1   1   2
## 653   2   1   2   2   1   2
## 654   2   1   2   1   1   2
## 655   2   1   3   1   1   2
## 656   2   1   2   1   1   2
## 657   2   1   2   1   1   2
## 658   8   1   3   6   1   2
## 659   3  10   7   2   3   4
## 660   2   1   1   1   1   2
## 661   2   1   2   1   1   2
```

```
## 662              2             1              3              1       1     2
## 663              2             1              2              1       1     2
## 664              2             1              2              1       1     2
## 665              2             1              2              1       1     2
## 666              2             1              1              1       1     2
## 667              2             1              1              1       2     2
## 668              2             1              3              1       1     2
## 669              6             1              7             10       3     4
## 670              5             5              7             10       1     4
## 671              5             8              7              4       1     4
## 672              2             1              3              1       1     2
## 673              2             1              3              1       1     2
## 674              3             1              1              1       1     2
## 675              2             1              2              1       1     2
## 676              2             1              1              1       1     2
## 677              2             1              2              1       1     2
## 678              2             1              1              1       1     2
## 679              2             1              1              1       1     2
## 680              2             1              1              1       1     2
## 681              5            10             10             10       7     4
## 682              4            10              5              6       3     4
## 683              2             1              3              2       1     2
## 684              2             1              1              1       1     2
## 685              2             1              1              1       1     2
## 686              2             1              1              1       1     2
## 687              2             1              1              1       1     2
## 688              2             1              2              3       1     2
## 689              2             1              1              1       1     2
## 690              2             1              1              1       8     2
## 691              2             1              1              1       1     2
## 692              4             5              4              4       1     4
## 693              2             1              1              1       1     2
## 694              2             1              2              1       2     2
## 695              3             2              1              1       1     2
## 696              2             1              1              1       1     2
## 697              7             3              8             10       2     4
## 698              3             4             10              6       1     4
## 699              4             5             10              4       1     4
```

```
'The data set is all about the collection of data that pertains to breast cancer diagnosis'
```

```
## [1] "The data set is all about the collection of data that pertains to breast cancer diagnosis"
```

#d.Compute the descriptive statistics using different packages. Find thevalues of:

#d1. Standard error of the mean for clump thickness.

```
se_mean_clump_thickness <- sd(breastcancer_wisconsin$clump_thickness) / sqrt(length(breastcancer_wiscons

cat("Standard Error of the Mean for Clump Thickness:", se_mean_clump_thickness, "\n")
```

```
## Standard Error of the Mean for Clump Thickness: 0.1065011
```

#d2. Coefficient of variability for Marginal Adhesion.

```
cv_marginal_adhesion <- sd(breastcancer_wisconsin$marginal_adhesion) / mean(breastcancer_wisconsin$margi
```

```r
cat("Coefficient of Variability for Marginal Adhesion:", cv_marginal_adhesion, "%\n")
```

```
## Coefficient of Variability for Marginal Adhesion: 101.7283 %
```

#d3. Number of null values of Bare Nuclei.

```r
null_values_bare_nuclei <- sum(is.na(breastcancer_wisconsin$bare_nucleoli))
null_values_bare_nuclei
```

```
## [1] 15
```

```r
cat("Number of Null Values of Bare Nuclei:", null_values_bare_nuclei, "\n")
```

```
## Number of Null Values of Bare Nuclei: 15
```

#d4. Mean and standard deviation for Bland Chromatin

```r
mean_bland_chromatin <- mean(breastcancer_wisconsin$bland_chromatin)
sd_bland_chromatin <- sd(breastcancer_wisconsin$bland_chromatin)

cat("Mean for Bland Chromatin:", mean_bland_chromatin, "\n")
```

```
## Mean for Bland Chromatin: 3.437768
```

```r
cat("Standard Deviation for Bland Chromatin:", sd_bland_chromatin, "\n")
```

```
## Standard Deviation for Bland Chromatin: 2.438364
```

#d5. Confidence interval of the mean for Uniformity of Cell Shape

```r
ci_mean_uniformity_cell_shape <- t.test(breastcancer_wisconsin$shape_uniformity)$conf.int

cat("Confidence Interval of the Mean for Uniformity of Cell Shape:", ci_mean_uniformity_cell_shape, "\n
```

```
## Confidence Interval of the Mean for Uniformity of Cell Shape: 2.986741 3.428138
```

#d. How many attributes?

```r
num_attributes <- ncol(breastcancer_wisconsin)

cat("Number of attributes (columns):", num_attributes, "\n")
```

```
## Number of attributes (columns): 11
```