RWorksheet_Lego#6

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#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
```

```r
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.

```r
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
```

```r
'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?

```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.

```r
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
```

```r
'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 autom
```

#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():

```r
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.

```r
 '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
```

```r
'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."
```

```r
'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."
```

```r
'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"
```

```r
'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 o
```

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

```r
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
```

```r
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/16MFLoehCgx2MJuNSAuB2Cs u/view?usp=drive_link) ##Note Kindly click on the word BreastCancer to download the dataset. ##a. describe what is the dataset all about.

```r
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
## 486  1002025              1                1                1                  3
## 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
## 534	1043068	3	1	1	1
## 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
## 553  1299924                3                2                2                2
## 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
## 573   183936                3                1                1                1
## 574   324382                1                1                1                1
## 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
## 584  1115762                3                1                1                1
## 585  1217717                5                1                1                6
## 586  1239420                1                1                1                1
## 587  1254538                8               10               10               10
## 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
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## 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
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## 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
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## 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
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## 510                  2            1              1              1       1     2
## 511                  2            1              1              1       1     2
## 512                  2            1              2              1       1     2
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## 515                  3           10              8             10       2     4
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## 517                  1            1              1              1       1     2
## 518                  1            1              2              1       1     2
## 519                  2            1              1              1       1     2
## 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
## 524                  4           10              5              3       1     4
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## 527                  2            1              1              1       1     2
## 528                  2            1              3              1       1     2
## 529                  2            1              1              1       1     2
## 530                  1            1              2              1       1     2
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## 533                  1            1              3              1       1     2
## 534                  2            1              2              1       1     2
## 535                  2            1              2              1       1     2
## 536                  2            1              3              1       1     2
## 537                  2            1              3              1       1     2
## 538                  2            1              3              1       1     2
## 539                  2            1              2              1       1     2
## 540                  2            1              2              1       1     2
## 541                  2            2              2              1       1     2
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## 544                  2            1              2              1       1     2
## 545                  2            1              2              1       1     2
## 546                  2            1              2              1       1     2
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## 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
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## 554                    2                 5                     2                   1         2         2
## 555                    2                 1                     1                   1         1         2
## 556                    2                 1                     4                   8         1         2
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## 558                    2                 1                     1                   1         1         2
## 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
## 565                    2                 1                     3                   2         1         2
## 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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## 578                    2                 1                     2                   1         1         2
## 579                    2                 1                     2                   1         1         2
## 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

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.

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

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

```
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

```
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
```

```
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

```
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?

```
num_attributes <- ncol(breastcancer_wisconsin)

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

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