RWorksheet_6

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1. Create a data frame for the table below. Show your solution.

```
Student_score <- data.frame(
  Student = c(1:10),
  Pre_test = c(55,54,47,57,51,61,57,54,63,58),
  Post_test = c(61,60,56,63,56,63,59,56,62,61)
)
Student_score
```

```
##    Student Pre_test Post_test
## 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
```

```
names(Student_score) <- c("Student","Pre-test","Post-test")
```

1a. Compute the descriptive statistics using different packages (Hmisc and pastecs). Write the codes and its result.

```
install.packages("Hmisc")
```

```
## Installing package into '/cloud/lib/x86_64-pc-linux-gnu-library/4.3'
## (as 'lib' is unspecified)
```

```
install.packages("pastecs")
```

```
## Installing package into '/cloud/lib/x86_64-pc-linux-gnu-library/4.3'
## (as 'lib' is unspecified)
```

```
library(Hmisc)
```

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

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

```
library(pastecs)
```

```r
describe(Student_score)
```

```
## Student_score
##
##  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
## --------------------------------------------------------------------------------
## Pre-test
##        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
## --------------------------------------------------------------------------------
## Post-test
##        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
stat.desc(Student_score)
```

```
##                 Student     Pre-test    Post-test
## 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.

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

ordered_lvl <- ordered(fertilizer_lvl, levels = c(10,20,50))

ordered_lvl
```

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

```
# The numbers inside the square brackets represent the observations or data points and below it are the
```

3. Abdul Hassan, president of Floor Coverings Unlimited, has asked you to study the ex- ercise 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?

```
lvlExercise <- c("n", "l", "n", "n", "l", "l", "n", "n", "i", "l")
factoredLvlExercise <- factor(lvlExercise, levels = c("n","l","i"))

summaryExercise <- summary(factoredLvlExercise)
summaryExercise
```

```
## n l i
## 5 4 1
```

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")

state_factor <- factor(state, levels = c("act", "nsw", "nt", "qld", "sa", "tas", "vic", "wa"))

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
```

```
#The levels are listed below the number that is enclosed in square brackets and represents the observat
```

5. From #4 - continuation: • Suppose we have the incomes of the same tax accountants in another vector (in suitably large units of money)

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

```
incomes <- c(60, 49, 40, 61, 64, 60, 59, 54,
62, 69, 70, 42, 56, 61, 61, 61, 58, 51, 48,
65, 49, 49, 41, 48, 52, 46, 59, 46, 58, 43)
```

```r
incmeans <- tapply(incomes, state_factor, mean)
incmeans
```

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

```r
#b. Copy the results and

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

#The average income for each state is included in this output. Additionally, each name corresponds to a
```

6. Calculate the standard errors of the state income means (refer again to number 3)

stdError <- function(x) sqrt(var(x)/length(x)) Note: After this assignment, the standard errors are calculated by: incster <- tapply(incomes, statef, stdError)

a. What is the standard error? Write the codes.

```r
stdError <- function(x) sqrt(var(x)/length(x))
incster <- tapply(incomes, state_factor, stdError)
incster
```

```
##      act      nsw       nt      qld       sa      tas      vic       wa
## 1.500000 4.310195 4.500000 4.106093 2.738613 0.500000 5.244044 2.657536
```

```r
standardError <- tapply(incomes, state_factor, stdError)
standardError
```

```
##      act      nsw       nt      qld       sa      tas      vic       wa
## 1.500000 4.310195 4.500000 4.106093 2.738613 0.500000 5.244044 2.657536
```

b. Interpret the result.

#Here, we compute the standard error of each state, whereas in # 5. we observe the means of each state.

#A measure of the uncertainty surrounding the sample mean incomes for each state is given by the standard errors. Greater diversity in the estimates is suggested by higher standard errors, whereas lower standard errors indicate more accurate estimates.

7. Use the titanic dataset.

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

```r
install.packages("titanic")
```

```
## Installing package into '/cloud/lib/x86_64-pc-linux-gnu-library/4.3'
## (as 'lib' is unspecified)
```

```r
library(titanic)

data("titanic_train")

survived <- subset(titanic_train, Survived == 1)

not_survived <- subset(titanic_train, Survived == 0)

head(survived)
```

```
##   PassengerId Survived Pclass
## 2           2        1      1
```

```
## 3             3        1      3
## 4             4        1      1
## 9             9        1      3
## 10           10        1      2
## 11           11        1      3
##                                                 Name    Sex Age SibSp Parch
## 2  Cumings, Mrs. John Bradley (Florence Briggs Thayer) female  38     1     0
## 3                               Heikkinen, Miss. Laina female  26     0     0
## 4         Futrelle, Mrs. Jacques Heath (Lily May Peel) female  35     1     0
## 9    Johnson, Mrs. Oscar W (Elisabeth Vilhelmina Berg) female  27     0     2
## 10                 Nasser, Mrs. Nicholas (Adele Achem) female  14     1     0
## 11                     Sandstrom, Miss. Marguerite Rut female   4     1     1
##              Ticket    Fare Cabin Embarked
## 2          PC 17599 71.2833   C85        C
## 3  STON/O2. 3101282  7.9250              S
## 4            113803 53.1000  C123        S
## 9            347742 11.1333              S
## 10           237736 30.0708              C
## 11          PP 9549 16.7000    G6        S
```

```r
head(not_survived)
```

```
##    PassengerId Survived Pclass                           Name  Sex Age SibSp
## 1            1        0      3        Braund, Mr. Owen Harris male  22     1
## 5            5        0      3       Allen, Mr. William Henry male  35     0
## 6            6        0      3               Moran, Mr. James male  NA     0
## 7            7        0      1        McCarthy, Mr. Timothy J male  54     0
## 8            8        0      3 Palsson, Master. Gosta Leonard male   2     3
## 13          13        0      3 Saundercock, Mr. William Henry male  20     0
##    Parch    Ticket    Fare Cabin Embarked
## 1      0 A/5 21171  7.2500              S
## 5      0    373450  8.0500              S
## 6      0    330877  8.4583              Q
## 7      0     17463 51.8625   E46        S
## 8      1    349909 21.0750              S
## 13     0 A/5. 2151  8.0500              S
```

8.

```r
breastcancer <- read.csv("breastcancer_wisconsin.csv")
breastcancer
```

```
##            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
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## 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
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## 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
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## 416                 3             3                3                5       1      2
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## 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
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## 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
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## 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
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## 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
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## 478                2              1                1                1       1      2
## 479                2              1                1                1       1      2
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## 483               10              5               10               10      10      4
## 484                5             10                9               10       1      4
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## 488                6             10                8                1       5      4
## 489                3              3                3                4       1      4
## 490                3              4                4                1       1      4
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## 494                6             10                6                5       2      4
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## 496                1              1                2                1       1      2
## 497                1              1                1                1       1      2
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## 499                2              1                2                1       1      2
## 500                2              1                2                1       1      2
## 501                2              1                3                1       1      2
```

```
## 502             2            1              2              1      1    2
## 503             2            1              2              1      1    2
## 504             2            1              3              1      1    2
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## 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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## 514             1            1              2              1      1    2
## 515             3           10              8             10      2    4
## 516             3           10              9             10      1    4
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## 518             1            1              2              1      1    2
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## 520             4           10              9              1      1    4
## 521             3            1              1              1      1    2
## 522             3            1              1              1      1    2
## 523             3            5              7              3      1    4
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## 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
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## 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
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## 542             2            1              1              1      1    2
## 543             2            1              1              1      1    2
## 544             2            1              2              1      1    2
## 545             2            1              2              1      1    2
## 546             2            1              2              1      1    2
## 547             4           10              7             10      1    4
## 548             1            1              1              1      1    2
## 549             1            1              1              1      1    2
## 550             4            5              7              8      2    4
## 551             2            1              2              1      1    2
## 552             2            1              3              1      1    2
## 553             2            1              4              2      1    2
## 554             2            5              2              1      2    2
## 555             2            1              1              1      1    2
```

```
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## 563                  2                1                   3                  1         1        2
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## 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
## 577                  2                1                   2                  1         1        2
## 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
```

```r
str(breastcancer)
```

```
## 'data.frame':    699 obs. of  11 variables:
##  $ id               : int  1000025 1002945 1015425 1016277 1017023 1017122 1018099 1018561 1033078 10
##  $ clump_thickness  : int  5 5 3 6 4 8 1 2 2 4 ...
##  $ size_uniformity  : int  1 4 1 8 1 10 1 1 1 2 ...
##  $ shape_uniformity : int  1 4 1 8 1 10 1 2 1 1 ...
##  $ marginal_adhesion: int  1 5 1 1 3 8 1 1 1 1 ...
##  $ epithelial_size  : int  2 7 2 3 2 7 2 2 2 2 ...
##  $ bare_nucleoli    : chr  "1" "10" "2" "4" ...
##  $ bland_chromatin  : int  3 3 3 3 3 9 3 3 1 2 ...
##  $ normal_nucleoli  : int  1 2 1 7 1 7 1 1 1 1 ...
##  $ mitoses          : int  1 1 1 1 1 1 1 1 5 1 ...
##  $ class            : int  2 2 2 2 2 4 2 2 2 2 ...
```

```r
head(breastcancer)
```

```
##        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
##   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
```

```r
summary(breastcancer)
```

```
##        id           clump_thickness  size_uniformity  shape_uniformity
##  Min.   :   61634   Min.   : 1.000   Min.   : 1.000   Min.   : 1.000
##  1st Qu.:  870688   1st Qu.: 2.000   1st Qu.: 1.000   1st Qu.: 1.000
##  Median : 1171710   Median : 4.000   Median : 1.000   Median : 1.000
##  Mean   : 1071704   Mean   : 4.418   Mean   : 3.134   Mean   : 3.207
##  3rd Qu.: 1238298   3rd Qu.: 6.000   3rd Qu.: 5.000   3rd Qu.: 5.000
##  Max.   :13454352   Max.   :10.000   Max.   :10.000   Max.   :10.000
##  marginal_adhesion epithelial_size  bare_nucleoli      bland_chromatin
##  Min.   : 1.000    Min.   : 1.000   Length:699         Min.   : 1.000
##  1st Qu.: 1.000    1st Qu.: 2.000   Class :character   1st Qu.: 2.000
##  Median : 1.000    Median : 2.000   Mode  :character   Median : 3.000
##  Mean   : 2.807    Mean   : 3.216                      Mean   : 3.438
##  3rd Qu.: 4.000    3rd Qu.: 4.000                      3rd Qu.: 5.000
##  Max.   :10.000    Max.   :10.000                      Max.   :10.000
##  normal_nucleoli     mitoses           class
##  Min.   : 1.000   Min.   : 1.000   Min.   :2.00
##  1st Qu.: 1.000   1st Qu.: 1.000   1st Qu.:2.00
##  Median : 1.000   Median : 1.000   Median :2.00
##  Mean   : 2.867   Mean   : 1.589   Mean   :2.69
##  3rd Qu.: 4.000   3rd Qu.: 1.000   3rd Qu.:4.00
##  Max.   :10.000   Max.   :10.000   Max.   :4.00
```

```r
#the dataset is about the data of the breast cancer.
```

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/16MFLoehCgx2MJu u/view?usp=drive_link)

Note Kindly click on the word BreastCancer to download the dataset. a. describe what is the dataset all about.

install.packages("psych") library(psych)

clump_thickness <- breastcancer_data$ClumpThickness marginal_adhesion < -breastcancer_data$MarginalAdhesion bare_nuclei <- breastcancer_data$BareNuclei bland_chromatin < -breastcancer_data$BlandChromatin uniformity_cell_shape <- breastcancer_data$UniformityCellShape

```r
library(readr)
library(pastecs)
library(Hmisc)

breastCancer <- read.csv("breastcancer_wisconsin.csv")
```

```
breastCancer
```

```
##          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
## 418          2          1          2          1     1    2
## 419          2          2          3          2     2    2
## 420          5          1          1          1     1    2
## 421          2          3          3          1     1    2
## 422         10         10          8          2     1    4
## 423          2          1          3          3     1    2
## 424          2          1          2          1     1    2
## 425          2          1          1          1     1    2
## 426         10         10         10         10     1    4
## 427          2          1          1          1     1    2
## 428          4          2          5         10     1    4
## 429          2          1          2          1     1    2
## 430          2          1          2          1     1    2
## 431          2          1          2          2     1    2
```

```
## 432      4     1     3     2     1  2
## 433      2     1     2     2     1  2
## 434      2     1     1     1     1  2
## 435      5     8     4     2     1  2
## 436      3    10     5     1     1  4
## 437      6     1     2     8     1  4
## 438      2     1     1     1     1  2
## 439      2     1     1     1     1  2
## 440      2     1     1     1     1  2
## 441      4    10    10     1     1  4
## 442      2     4     1     1     1  2
## 443      2     3     1     1     1  2
## 444      2     2     1     1     1  2
## 445      3     1     2     1     1  2
## 446      2     1     1     1     1  2
## 447      2     1     1     1     1  2
## 448      2     1     1     1     1  2
## 449      1     1     1     1     1  2
## 450      6    10     8    10     1  4
## 451      1     1     2     1     1  2
## 452      2     1     1     1     1  2
## 453      2     1     1     1     1  2
## 454      6    10    10     7     1  4
## 455      3     1     1     1     1  2
## 456      2     6     1     1     2  4
## 457      5    10     8     6     1  4
## 458      6     3    10    10     1  4
## 459      2     1     1     1     1  2
## 460      2     1     1     1     1  2
## 461      2     1     1     1     1  2
## 462      2     5     1     1     1  2
## 463      2     1     1     1     1  2
## 464      2     1     1     2     1  2
## 465      2     1     1     1     1  2
## 466      6     4     7    10     3  4
## 467      4    10     9     7     1  4
## 468      4    10     7     6     2  4
## 469      2     1     1     1     1  2
## 470      2     1     2     1     1  2
## 471      1     1     2     1     1  2
## 472      2     1     1     1     1  2
## 473      1     1     1     1     1  2
## 474      2     1     1     1     1  2
## 475      2     1     1     1     1  2
## 476      2     1     1     1     1  2
## 477      2     1     1     1     1  2
## 478      2     1     1     1     1  2
## 479      2     1     1     1     1  2
## 480      4    10     7     5     1  4
## 481      1     1     1     1     1  2
## 482      2     1     1     1     1  2
## 483     10     5    10    10    10  4
## 484      5    10     9    10     1  4
## 485      2     1     1     1     1  2
```

```
## 486                    1              3                1               1      1    2
## 487                    1              1                2               1      1    2
## 488                    6             10                8               1      5    4
## 489                    3              3                3               4      1    4
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## 491                    2              1                1               1      1    2
## 492                    3             10                7               1      1    4
## 493                    1              1                2               1      1    2
## 494                    6             10                6               5      2    4
## 495                    4              5                2               1      1    2
## 496                    1              1                2               1      1    2
## 497                    1              1                1               1      1    2
## 498                    2              1                1               1      1    2
## 499                    2              1                2               1      1    2
## 500                    2              1                2               1      1    2
## 501                    2              1                3               1      1    2
## 502                    2              1                2               1      1    2
## 503                    2              1                2               1      1    2
## 504                    2              1                3               1      1    2
## 505                    2              1                1               1      1    2
## 506                    2              1                1               1      1    2
## 507                    7              5                4               8      7    4
## 508                    2              4                1               1      1    2
## 509                    2              1                1               1      1    2
## 510                    2              1                1               1      1    2
## 511                    2              1                1               1      1    2
## 512                    2              1                2               1      1    2
## 513                    2              1                1               1      1    2
## 514                    1              1                2               1      1    2
## 515                    3             10                8              10      2    4
## 516                    3             10                9              10      1    4
## 517                    1              1                1               1      1    2
## 518                    1              1                2               1      1    2
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## 520                    4             10                9               1      1    4
## 521                    3              1                1               1      1    2
## 522                    3              1                1               1      1    2
## 523                    3              5                7               3      1    4
## 524                    4             10                5               3      1    4
## 525                    2              1                2               1      1    2
## 526                    2              1                1               1      1    2
## 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
## 531                    4             10                6               9      1    4
## 532                    2              1                2               1      1    2
## 533                    1              1                3               1      1    2
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## 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
## 542                2             1             1             1      1     2
## 543                2             1             1             1      1     2
## 544                2             1             2             1      1     2
## 545                2             1             2             1      1     2
## 546                2             1             2             1      1     2
## 547                4            10             7            10      1     4
## 548                1             1             1             1      1     2
## 549                1             1             1             1      1     2
## 550                4             5             7             8      2     4
## 551                2             1             2             1      1     2
## 552                2             1             3             1      1     2
## 553                2             1             4             2      1     2
## 554                2             5             2             1      2     2
## 555                2             1             1             1      1     2
## 556                2             1             4             8      1     2
## 557                1             1             2             1      1     2
## 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
## 577                2             1             2             1      1     2
## 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
```

```r
breastCancerStats <- stat.desc(breastCancer)
breastCancerStats
```

```
##                        id clump_thickness size_uniformity shape_uniformity
## nbr.val      6.990000e+02     699.0000000     699.0000000      699.0000000
## nbr.null     0.000000e+00       0.0000000       0.0000000        0.0000000
## nbr.na       0.000000e+00       0.0000000       0.0000000        0.0000000
## min          6.163400e+04       1.0000000       1.0000000        1.0000000
## max          1.345435e+07      10.0000000      10.0000000       10.0000000
## range        1.339272e+07       9.0000000       9.0000000        9.0000000
## sum          7.491212e+08    3088.0000000    2191.0000000     2242.0000000
## median       1.171710e+06       4.0000000       1.0000000        1.0000000
## mean         1.071704e+06       4.4177396       3.1344778        3.2074392
## SE.mean      2.334070e+04       0.1065011       0.1154168        0.1124081
## CI.mean.0.95 4.582640e+04       0.2091009       0.2266057        0.2206984
## var          3.808071e+11       7.9283955       9.3114027        8.8322655
## std.dev      6.170957e+05       2.8157407       3.0514591        2.9719128
## coef.var     5.758079e-01       0.6373713       0.9735143        0.9265687
##              marginal_adhesion epithelial_size bare_nucleoli bland_chromatin
## nbr.val            699.0000000    6.990000e+02            NA    6.990000e+02
## nbr.null             0.0000000    0.000000e+00            NA    0.000000e+00
## nbr.na               0.0000000    0.000000e+00            NA    0.000000e+00
## min                  1.0000000    1.000000e+00            NA    1.000000e+00
## max                 10.0000000    1.000000e+01            NA    1.000000e+01
## range                9.0000000    9.000000e+00            NA    9.000000e+00
## sum               1962.0000000    2.248000e+03            NA    2.403000e+03
## median               1.0000000    2.000000e+00            NA    3.000000e+00
## mean                 2.8068670    3.216023e+00            NA    3.437768e+00
## SE.mean              0.1080004    8.375251e-02            NA    9.222741e-02
## CI.mean.0.95         0.2120445    1.644370e-01            NA    1.810764e-01
## var                  8.1531906    4.903124e+00            NA    5.945620e+00
## std.dev              2.8553792    2.214300e+00            NA    2.438364e+00
## coef.var             1.0172834    6.885212e-01            NA    7.092870e-01
##              normal_nucleoli      mitoses        class
## nbr.val          699.0000000 6.990000e+02 6.990000e+02
## nbr.null           0.0000000 0.000000e+00 0.000000e+00
## nbr.na             0.0000000 0.000000e+00 0.000000e+00
## min                1.0000000 1.000000e+00 2.000000e+00
## max               10.0000000 1.000000e+01 4.000000e+00
## range              9.0000000 9.000000e+00 2.000000e+00
## sum             2004.0000000 1.111000e+03 1.880000e+03
## median             1.0000000 1.000000e+00 2.000000e+00
## mean               2.8669528 1.589413e+00 2.689557e+00
## SE.mean            0.1154990 6.487021e-02 3.598043e-02
## CI.mean.0.95       0.2267672 1.273641e-01 7.064284e-02
## var                9.3246800 2.941492e+00 9.049194e-01
## std.dev            3.0536339 1.715078e+00 9.512725e-01
## coef.var           1.0651148 1.079063e+00 3.536912e-01
```

```r
clump_thickness_SEmean <- breastCancerStats["SE.mean", "clump_thickness"]
clump_thickness_SEmean
```

```
## [1] 0.1065011
```

```r
marginal_adhesion_coefVar <- breastCancerStats["coef.var", "marginal_adhesion"]
marginal_adhesion_coefVar
```

```
## [1] 1.017283
```

```r
bare_nucleoli_null <- breastCancerStats["nbr.null", "bare_nucleoli"]
bare_nucleoli_null
```

```
## [1] NA
```

```r
bland_chromatin_mean <- breastCancerStats["mean", "bland_chromatin"]
bland_chromatin_mean
```

```
## [1] 3.437768
```

```r
bland_chromatin_std_dev <- breastCancerStats["std.dev", "bland_chromatin"]
bland_chromatin_std_dev
```

```
## [1] 2.438364
```

```r
shape_uniformity_CImean <- breastCancerStats["CI.mean", "shape_uniformity"]
shape_uniformity_CImean
```

```
## [1] 0.2206984
```

```r
#d. How many attributes?

num_attributes <- ncol(breastCancer)
num_attributes
```

```
## [1] 11
```

e. Find the percentage of respondents who are malignant. Interpret the results.

```r
# Assuming class 4 is malignant

percentage_malignant <- (sum(breastCancer$class == 4) / nrow(breastCancer)) * 100
paste0("Percentage of Respondents who are Malignant: ", percentage_malignant,"%")
```

```
## [1] "Percentage of Respondents who are Malignant: 34.4778254649499%"
```

9.Export the data abalone to the Microsoft excel file. Copy the codes.

```r
install.packages("AppliedPredictiveModeling")
```

```
## Installing package into '/cloud/lib/x86_64-pc-linux-gnu-library/4.3'
## (as 'lib' is unspecified)
```

```r
library(AppliedPredictiveModeling)

data("abalone")

install.packages("openxlsx")
```

```
## Installing package into '/cloud/lib/x86_64-pc-linux-gnu-library/4.3'
## (as 'lib' is unspecified)
```

```r
library(openxlsx)

write.xlsx(abalone, file = "abalone.xlsx")
```

```r
View(abalone)
```

```
## Warning in View(abalone): unable to open display
```

```
## Error in .External2(C_dataviewer, x, title): unable to start data viewer
```

```r
head(abalone)
```

```
##   Type LongestShell Diameter Height WholeWeight ShuckedWeight VisceraWeight
## 1    M        0.455    0.365  0.095      0.5140        0.2245        0.1010
## 2    M        0.350    0.265  0.090      0.2255        0.0995        0.0485
## 3    F        0.530    0.420  0.135      0.6770        0.2565        0.1415
## 4    M        0.440    0.365  0.125      0.5160        0.2155        0.1140
## 5    I        0.330    0.255  0.080      0.2050        0.0895        0.0395
## 6    I        0.425    0.300  0.095      0.3515        0.1410        0.0775
##   ShellWeight Rings
## 1       0.150    15
## 2       0.070     7
## 3       0.210     9
## 4       0.155    10
## 5       0.055     7
## 6       0.120     8
```

```r
summary(abalone)
```

```
##  Type      LongestShell      Diameter          Height        WholeWeight
##  F:1307   Min.   :0.075   Min.   :0.0550   Min.   :0.0000   Min.   :0.0020
##  I:1342   1st Qu.:0.450   1st Qu.:0.3500   1st Qu.:0.1150   1st Qu.:0.4415
##  M:1528   Median :0.545   Median :0.4250   Median :0.1400   Median :0.7995
##           Mean   :0.524   Mean   :0.4079   Mean   :0.1395   Mean   :0.8287
##           3rd Qu.:0.615   3rd Qu.:0.4800   3rd Qu.:0.1650   3rd Qu.:1.1530
##           Max.   :0.815   Max.   :0.6500   Max.   :1.1300   Max.   :2.8255
##  ShuckedWeight    VisceraWeight     ShellWeight         Rings
##  Min.   :0.0010   Min.   :0.0005   Min.   :0.0015   Min.   : 1.000
##  1st Qu.:0.1860   1st Qu.:0.0935   1st Qu.:0.1300   1st Qu.: 8.000
##  Median :0.3360   Median :0.1710   Median :0.2340   Median : 9.000
##  Mean   :0.3594   Mean   :0.1806   Mean   :0.2388   Mean   : 9.934
##  3rd Qu.:0.5020   3rd Qu.:0.2530   3rd Qu.:0.3290   3rd Qu.:11.000
##  Max.   :1.4880   Max.   :0.7600   Max.   :1.0050   Max.   :29.000
```