

# RWorksheet\_5.Rmd

2023-12-06

1. Create a data frame for the table below. Show your solution.
  - a. Compute the descriptive statistics using different packages (Hmisc and pastecs). Write the codes and its result.

```
library(Hmisc)

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

library(pastecs)
studentData<- data.frame(
  Student <- c(1:10),
  preTest <- c(55,54,47,57,51,61,57,54,63,58),
  postTest <- c(61,60,56,63,56,63,59,56,62,61))

colnames(studentData) <- c("Student", "preTest","postTest")
studentData

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

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.

```
fertilizerData<- c(10,10,10, 20,20,50,10,20,10,50,20,50,20,10.)
ordered(fertilizerData)

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

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

```
exerciseLevels<- c("l", "n", "n", "i", "l", "l", "n", "n", "i", "l")
factor_exerciselevels<- factor(exerciseLevels)
```

```
levels(factor_exerciselevels) <- c("none","light","intense")
factor_exerciselevels
```

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

4a.a. Apply the factor function and factor level. Describe the results.

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

```
## [1] "act" "nsw" "nt"  "qld" "sa"  "tas" "vic" "wa"
```

```
factor_state
```

```
## [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
```

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

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

```
data <- data.frame(State = factor_state, Income = incomes)
print(data)
```

```
##      State Income
## 1      tas      60
## 2       sa      49
## 3      qld      40
## 4      nsw      61
## 5      nsw      64
## 6       nt      60
## 7       wa      59
## 8       wa      54
## 9      qld      62
## 10     vic      69
## 11     nsw      70
## 12     vic      42
## 13     qld      56
## 14     qld      61
## 15      sa      61
## 16     tas      61
## 17      sa      58
## 18      nt      51
## 19      wa      48
## 20     vic      65
## 21     qld      49
## 22     nsw      49
```

```
## 23   nsw    41
## 24    wa    48
## 25    sa    52
## 26   act    46
## 27   nsw    59
## 28   vic    46
## 29   vic    58
## 30   act    43
```

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

```
mean_income <- tapply(incomes, factor_state, mean)
print(mean_income)
```

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

- b. Copy the results and interpret. act nsw nt qld sa tas 44.50000 57.33333 55.50000 53.60000 55.00000 60.50000 vic wa 56.00000 52.25000

Interpretation: These values represent the average income for tax accountants from all the states and territories of Australia.

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

```
stdError <- function(x) sqrt(var(x) / length(x))
errors_means <- tapply(incomes, factor_state, stdError)

print(errors_means)
```

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

6.

- a. What is the standard error? Write the codes.  
b. Interpret the result.

Interpretation: The overall standard error serves as an indicator of how precise the sample mean estimate is for the entire group of tax accountants.

```
total_stdError <- stdError(incomes)
total_stdError
```

```
## [1] 1.524462
```

7. Use the titanic dataset.

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

```
library(titanic)

data("titanic_train")
titanicData <- titanic_train

people_survived <- subset(titanicData, Survived == 1)
people_not_survived <- subset(titanicData, Survived == 0)

head(people_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
```

```
head(people_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  Saunderson, 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. The data sets are about the breast cancer Wisconsin. The samples arrive periodically as Dr. Wolberg reports his clinical cases.
  - a. describe what is the dataset all about. < The Breast Cancer Wisconsin dataset consists of various quantitative and qualitative features extracted from biopsy samples, each associated with a unique ID number. These features are clump thickness, size uniformity, shape uniformity, marginal adhesion, epithelial size, bare nucleoli, bland chromatin, normal nucleoli, mitoses, class.
  - b. Compute the descriptive statistics using different packages. Find the values of: d.1 Standard error of the mean for clump thickness. d.2 Coefficient of variability for Marginal Adhesion. d.3 Number of null values of Bare Nuclei. d.4 Mean and standard deviation for Bland Chromatin d.5 Confidence interval of the mean for Uniformity of Cell Shape.

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

```
##      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
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## 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

```
#8.d1
```

```
stdError_clumpThickness <- sd(breastCancer_Data$clump_thickness) / sqrt(length(breastCancer_Data$clump_
```

```
stdError_clumpThickness
```

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

```
#8.d2
coefficient_marginalAdhesion <- sd(breastCancer_Data$marginal_adhesion) / mean(breastCancer_Data$marginal_adhesion)

coefficient_marginalAdhesion
```

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

```
#8.d3
nullValues_bareNuclei <- sum(is.na(breastCancer_Data$bare_nuclei))

nullValues_bareNuclei
```

```
## [1] 0
```

```
#8.d4
mean_blandChromatin <- mean(breastCancer_Data$bland_chromatin)
sd_blandChromatin <- sd(breastCancer_Data$bland_chromatin)

mean_blandChromatin
```

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

```
sd_blandChromatin
```

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

```
#8.d5
confidenceInterval_uniformityCellShape <- t.test(breastCancer_Data$shape_uniformity)$conf.int

confidenceInterval_uniformityCellShape
```

```
## [1] 2.986741 3.428138
```

```
## attr(,"conf.level")
```

```
## [1] 0.95
```

8d. How many attributes?

```
attributes(breastCancer_Data)
```

```
## $names
## [1] "id" "clump_thickness" "size_uniformity"
## [4] "shape_uniformity" "marginal_adhesion" "epithelial_size"
## [7] "bare_nucleoli" "bland_chromatin" "normal_nucleoli"
## [10] "mitoses" "class"
##
## $class
## [1] "data.frame"
##
## $row.names
## [1] 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18
## [19] 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36
## [37] 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54
## [55] 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72
## [73] 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90
## [91] 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105 106 107 108
## [109] 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126
## [127] 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144
## [145] 145 146 147 148 149 150 151 152 153 154 155 156 157 158 159 160 161 162
```

```
## [163] 163 164 165 166 167 168 169 170 171 172 173 174 175 176 177 178 179 180
## [181] 181 182 183 184 185 186 187 188 189 190 191 192 193 194 195 196 197 198
## [199] 199 200 201 202 203 204 205 206 207 208 209 210 211 212 213 214 215 216
## [217] 217 218 219 220 221 222 223 224 225 226 227 228 229 230 231 232 233 234
## [235] 235 236 237 238 239 240 241 242 243 244 245 246 247 248 249 250 251 252
## [253] 253 254 255 256 257 258 259 260 261 262 263 264 265 266 267 268 269 270
## [271] 271 272 273 274 275 276 277 278 279 280 281 282 283 284 285 286 287 288
## [289] 289 290 291 292 293 294 295 296 297 298 299 300 301 302 303 304 305 306
## [307] 307 308 309 310 311 312 313 314 315 316 317 318 319 320 321 322 323 324
## [325] 325 326 327 328 329 330 331 332 333 334 335 336 337 338 339 340 341 342
## [343] 343 344 345 346 347 348 349 350 351 352 353 354 355 356 357 358 359 360
## [361] 361 362 363 364 365 366 367 368 369 370 371 372 373 374 375 376 377 378
## [379] 379 380 381 382 383 384 385 386 387 388 389 390 391 392 393 394 395 396
## [397] 397 398 399 400 401 402 403 404 405 406 407 408 409 410 411 412 413 414
## [415] 415 416 417 418 419 420 421 422 423 424 425 426 427 428 429 430 431 432
## [433] 433 434 435 436 437 438 439 440 441 442 443 444 445 446 447 448 449 450
## [451] 451 452 453 454 455 456 457 458 459 460 461 462 463 464 465 466 467 468
## [469] 469 470 471 472 473 474 475 476 477 478 479 480 481 482 483 484 485 486
## [487] 487 488 489 490 491 492 493 494 495 496 497 498 499 500 501 502 503 504
## [505] 505 506 507 508 509 510 511 512 513 514 515 516 517 518 519 520 521 522
## [523] 523 524 525 526 527 528 529 530 531 532 533 534 535 536 537 538 539 540
## [541] 541 542 543 544 545 546 547 548 549 550 551 552 553 554 555 556 557 558
## [559] 559 560 561 562 563 564 565 566 567 568 569 570 571 572 573 574 575 576
## [577] 577 578 579 580 581 582 583 584 585 586 587 588 589 590 591 592 593 594
## [595] 595 596 597 598 599 600 601 602 603 604 605 606 607 608 609 610 611 612
## [613] 613 614 615 616 617 618 619 620 621 622 623 624 625 626 627 628 629 630
## [631] 631 632 633 634 635 636 637 638 639 640 641 642 643 644 645 646 647 648
## [649] 649 650 651 652 653 654 655 656 657 658 659 660 661 662 663 664 665 666
## [667] 667 668 669 670 671 672 673 674 675 676 677 678 679 680 681 682 683 684
## [685] 685 686 687 688 689 690 691 692 693 694 695 696 697 698 699
```

8e. Find the percentage of respondents who are malignant. Interpret the results.

```
malignantNum <- sum(breastCancer_Data$malignant == 1)

total_respondents <- nrow(breastCancer_Data)

malignant_prct <- (malignantNum / total_respondents) * 100
cat("Percentage of respondents who are malignant:", malignant_prct, "%\n")
```

```
## Percentage of respondents who are malignant: 0 %
```

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

```
library(xlsx)
abalone<- read.csv("abalone.csv")
xlsx::write.xlsx(abalone, "abalone.xls", col.names=TRUE, row.names=TRUE, sheetName="sample")

library("AppliedPredictiveModeling")
head(abalone)
```

```
##   Sex Length Diameter Height Whole.weight Shucked.weight Viscera.weight
## 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
## Shell.weight 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
```

```
summary(abalone)
```

```
## Sex Length Diameter Height
## Length:4177 Min. :0.075 Min. :0.0550 Min. :0.0000
## Class :character 1st Qu.:0.450 1st Qu.:0.3500 1st Qu.:0.1150
## Mode :character Median :0.545 Median :0.4250 Median :0.1400
## Mean :0.524 Mean :0.4079 Mean :0.1395
## 3rd Qu.:0.615 3rd Qu.:0.4800 3rd Qu.:0.1650
## Max. :0.815 Max. :0.6500 Max. :1.1300
## Whole.weight Shucked.weight Viscera.weight Shell.weight
## Min. :0.0020 Min. :0.0010 Min. :0.0005 Min. :0.0015
## 1st Qu.:0.4415 1st Qu.:0.1860 1st Qu.:0.0935 1st Qu.:0.1300
## Median :0.7995 Median :0.3360 Median :0.1710 Median :0.2340
## Mean :0.8287 Mean :0.3594 Mean :0.1806 Mean :0.2388
## 3rd Qu.:1.1530 3rd Qu.:0.5020 3rd Qu.:0.2530 3rd Qu.:0.3290
## Max. :2.8255 Max. :1.4880 Max. :0.7600 Max. :1.0050
## Rings
## Min. : 1.000
## 1st Qu.: 8.000
## Median : 9.000
## Mean : 9.934
## 3rd Qu.:11.000
## Max. :29.000
```