Expected answers

2023-09-26

Part 1: body mass and metabolic rate

Ex.2)

Expected output:

```
## Rows: 25 Columns: 3
## -- Column specification --------------------------------------------------------
## Delimiter: ","
## chr (1): family
## dbl (2): body_mass, metabolic_rate
##
## i Use `spec()` to retrieve the full column specification for this data.
## i Specify the column types or set `show_col_types = FALSE` to quiet this message.
```

```
## # A tibble: 6 x 3
##   body_mass metabolic_rate family
##       <dbl>          <dbl> <chr>
## 1     32000           50.0 Antilocapridae
## 2     37800           52.0 Antilocapridae
## 3    347000          307.  Bovidae
## 4      4200           10.1 Bovidae
## 5    196500          230.  Bovidae
## 6    100000          149.  Bovidae
```

Ex.5)

```
## spc_tbl_ [25 x 3] (S3: spec_tbl_df/tbl_df/tbl/data.frame)
##  $ body_mass     : num [1:25] 32000 37800 347000 4200 196500 ...
##  $ metabolic_rate: num [1:25] 50 52 306.8 10.1 230.1 ...
##  $ family        : chr [1:25] "Antilocapridae" "Antilocapridae" "Bovidae" "Bovidae" ...
##  - attr(*, "spec")=
##   .. cols(
##   ..   body_mass = col_double(),
##   ..   metabolic_rate = col_double(),
##   ..   family = col_character()
##   .. )
##  - attr(*, "problems")=<externalptr>
```

Ex.6)

Expected output:

```
## [1] "Antilocapridae" "Bovidae"        "Camelidae"      "Canidae"
## [5] "Cervidae"       "Suidae"         "Tayassuidae"    "Tragulidae"
```

```
## [1] "Antilocapridae" "Bovidae"        "Camelidae"      "Canidae"
## [5] "Cervidae"       "Suidae"         "Tayassuidae"    "Tragulidae"
```

Ex.9)

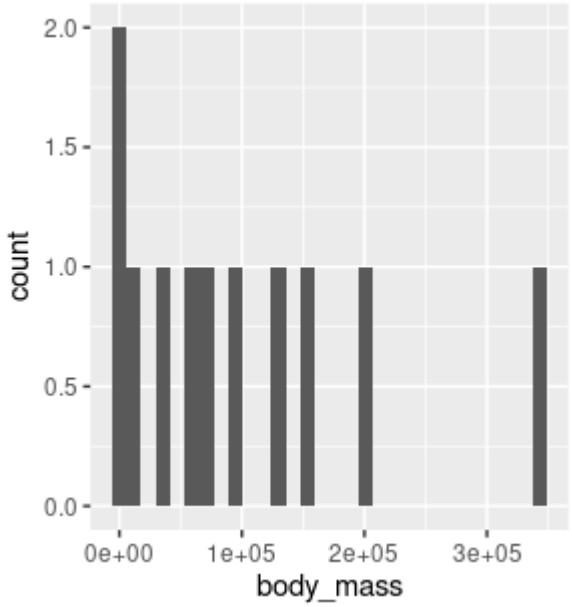
Expected output:

```
## # A tibble: 1 x 1
##    range
##    <dbl>
## 1 405387
```

```
## # A tibble: 1 x 1
##    range
##    <dbl>
## 1 342800
```

Ex.10)

Expected output:



Ex.11)

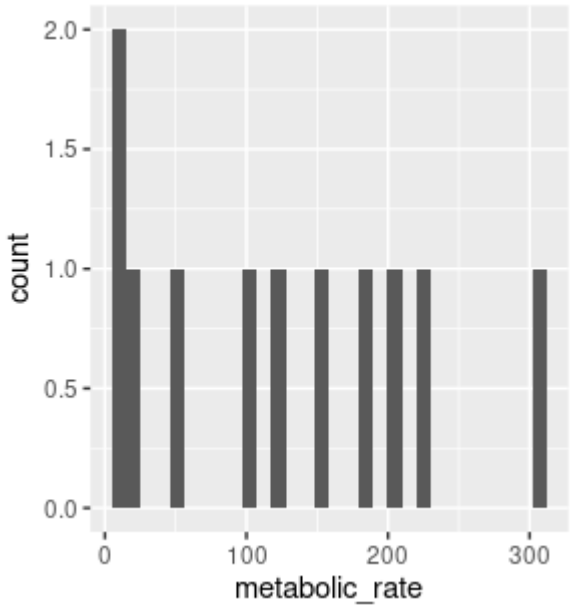
Expected outputs:

```
## # A tibble: 1 x 1
##   range
##   <dbl>
## 1  302.
```

```
## # A tibble: 1 x 1
##   range
##   <dbl>
## 1  297.
```

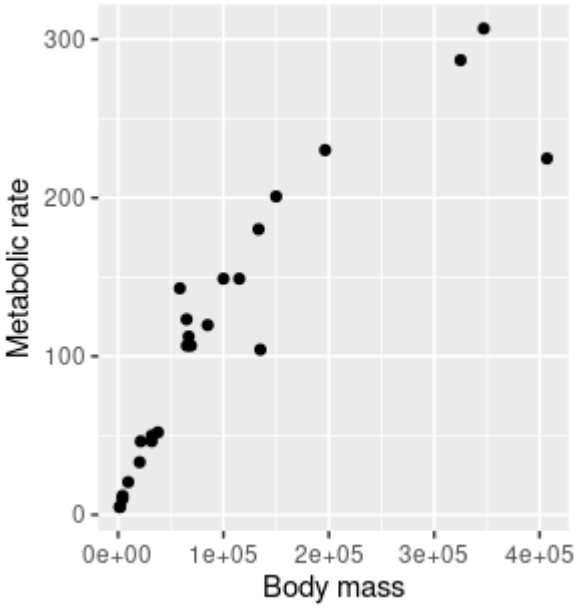
Ex.12)

Expected output:



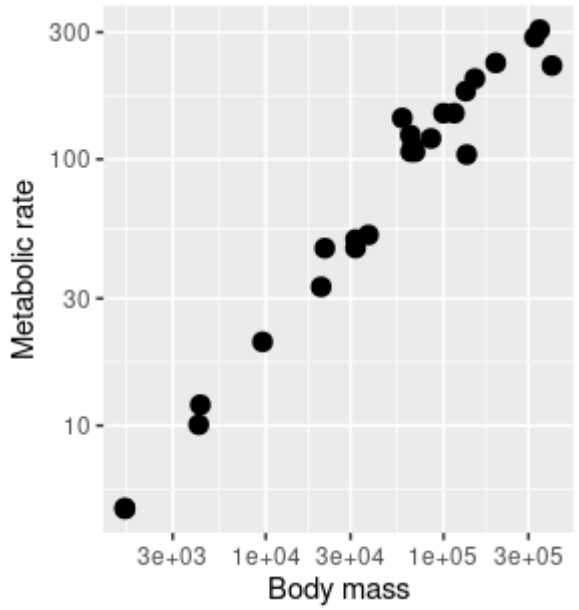
Ex.13)

Expected output:



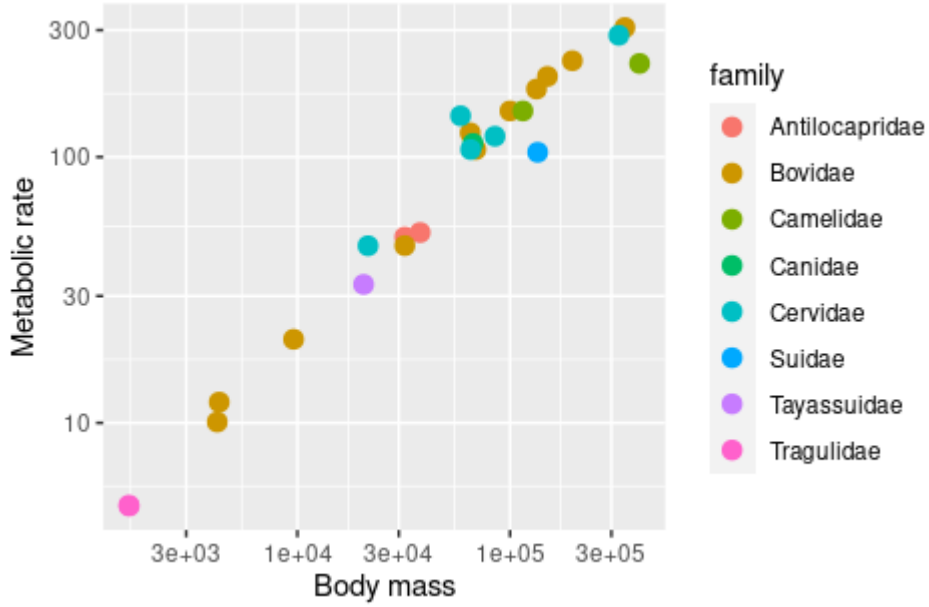
Ex.14)

Expected output:



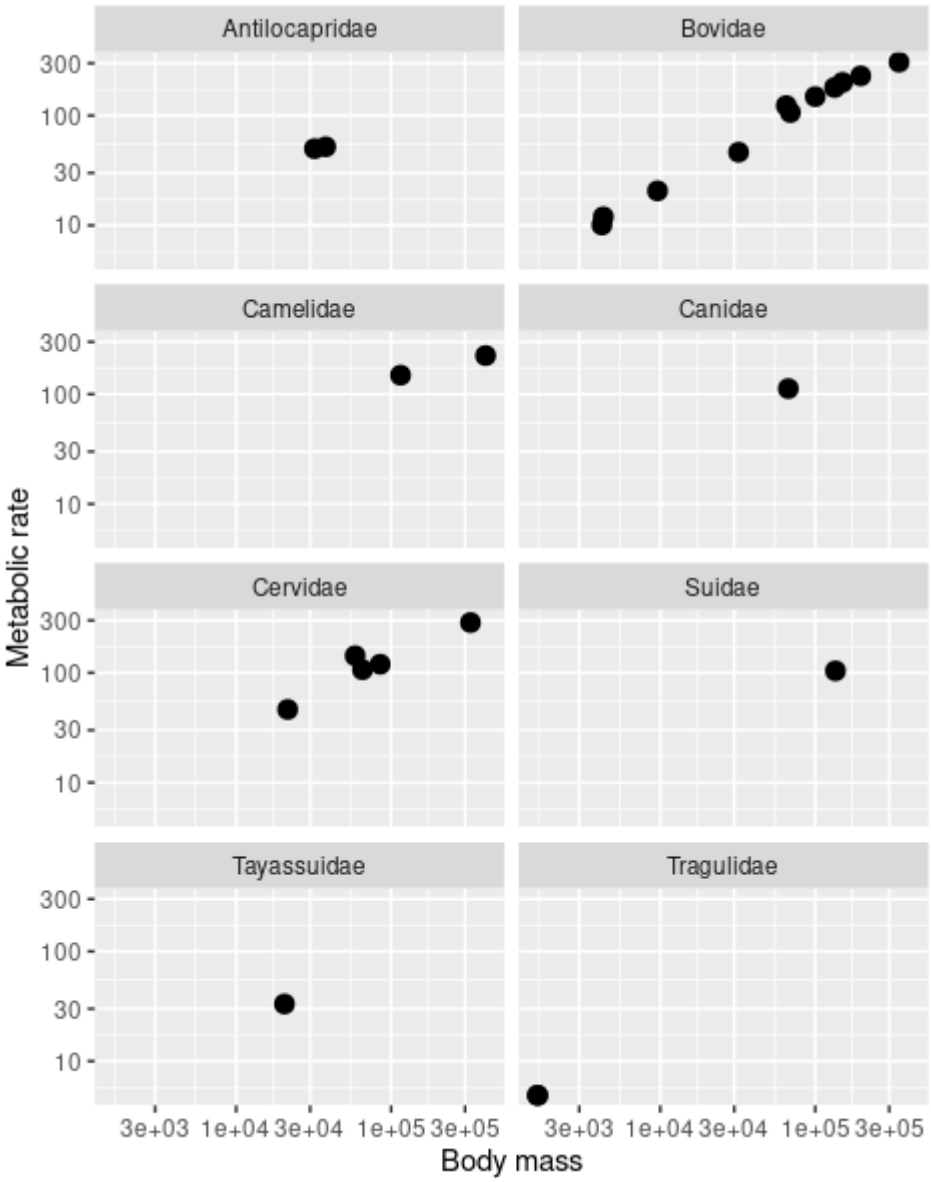
Ex.15)

Expected output:



Ex.16)

Expected output:



Ex.17)

Expected output:

```
## # A tibble: 8 x 3
##   family             N Range_body_mass
##   <fct>          <int>           <dbl>
## 1 Antilocapridae     2            5800
## 2 Bovidae           11          342800
## 3 Camelidae          2          292000
## 4 Canidae            1               0
## 5 Cervidae           5          303500
## 6 Suidae             1               0
## 7 Tayassuidae        1               0
## 8 Tragulidae         2               5
```

Part 2: Carbon storage in shrubs

Ex.18)

Expected output:

```
## Rows: 12 Columns: 5
## -- Column specification --------------------------------------------------------
## Delimiter: ","
## dbl (5): site, experiment, length, width, height
##
## i Use `spec()` to retrieve the full column specification for this data.
## i Specify the column types or set `show_col_types = FALSE` to quiet this message.
```

```
## # A tibble: 6 x 5
##    site experiment length width height
##   <dbl>      <dbl>  <dbl> <dbl>  <dbl>
## 1     1          1    2.2   1.3    9.6
## 2     1          2    2.1   2.2    7.6
## 3     1          3    2.7   1.5    2.2
## 4     2          1    3     4.5    1.5
## 5     2          2    3.1   3.1    4
## 6     2          3    2.5   2.8    3
```

```
## [1] 12  5
```

```
## spc_tbl_ [12 x 5] (S3: spec_tbl_df/tbl_df/tbl/data.frame)
##  $ site      : num [1:12] 1 1 1 2 2 2 3 3 3 4 ...
##  $ experiment: num [1:12] 1 2 3 1 2 3 1 2 3 1 ...
##  $ length    : num [1:12] 2.2 2.1 2.7 3 3.1 2.5 1.9 1.1 3.5 2.9 ...
##  $ width     : num [1:12] 1.3 2.2 1.5 4.5 3.1 2.8 1.8 0.5 2 2.7 ...
##  $ height    : num [1:12] 9.6 7.6 2.2 1.5 4 3 4.5 2.3 7.5 3.2 ...
##  - attr(*, "spec")=
##   .. cols(
##   ..   site = col_double(),
##   ..   experiment = col_double(),
##   ..   length = col_double(),
##   ..   width = col_double(),
##   ..   height = col_double()
##   .. )
##  - attr(*, "problems")=<externalptr>
```

```
##       site        experiment     length          width           height
##  Min.   :1.00   Min.   :1    Min.   :1.100   Min.   :0.500   Min.   :1.50
##  1st Qu.:1.75   1st Qu.:1    1st Qu.:2.050   1st Qu.:1.725   1st Qu.:2.60
##  Median :2.50   Median :2    Median :2.600   Median :2.100   Median :3.60
##  Mean   :2.50   Mean   :2    Mean   :2.558   Mean   :2.417   Mean   :4.55
##  3rd Qu.:3.25   3rd Qu.:3    3rd Qu.:3.025   3rd Qu.:2.875   3rd Qu.:6.75
##  Max.   :4.00   Max.   :3    Max.   :4.500   Max.   :4.800   Max.   :9.60
```

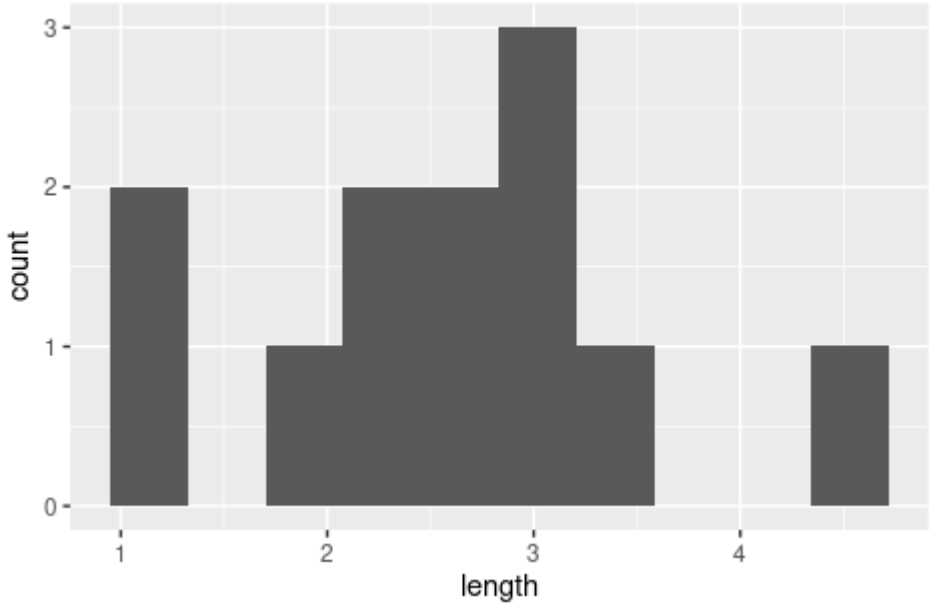
```
##  site  experiment     length          width           height
##  1:3   1:4        Min.   :1.100   Min.   :0.500   Min.   :1.50
##  2:3   2:4        1st Qu.:2.050   1st Qu.:1.725   1st Qu.:2.60
```

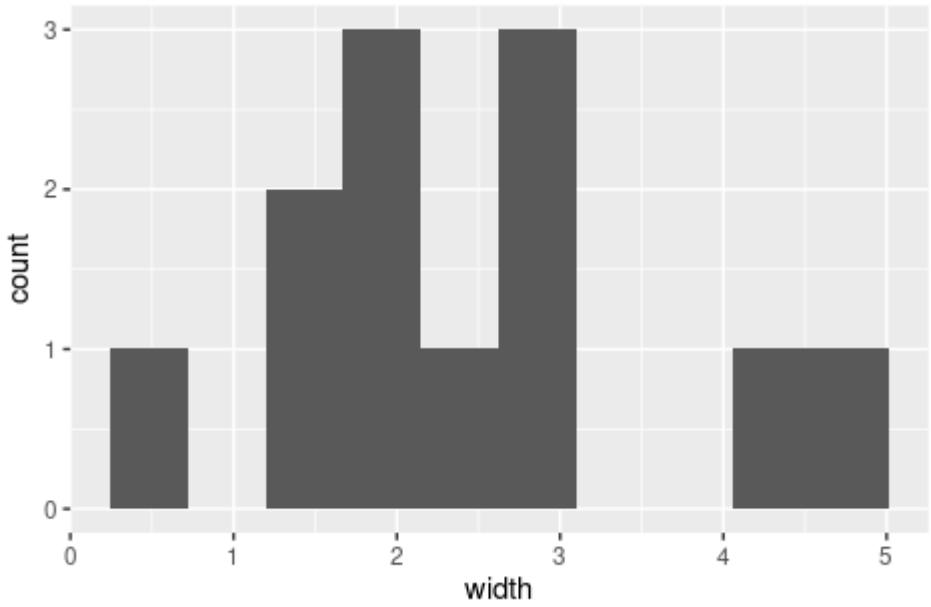
```
##  3:3   3:4        Median :2.600   Median :2.100   Median :3.60
##  4:3              Mean   :2.558   Mean   :2.417   Mean   :4.55
##                   3rd Qu.:3.025   3rd Qu.:2.875   3rd Qu.:6.75
##                   Max.   :4.500   Max.   :4.800   Max.   :9.60
```

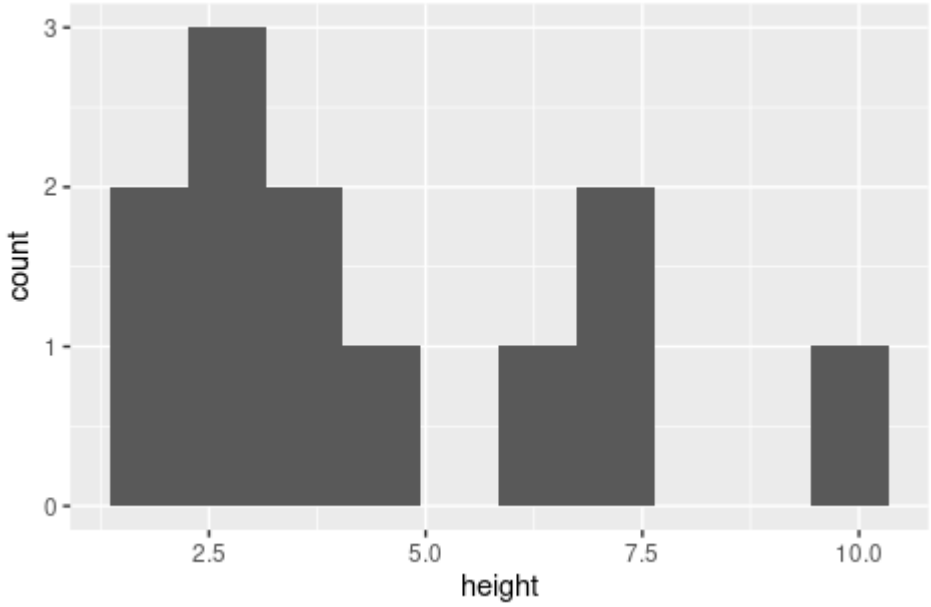
Ex.19)

Expected outputs:

```
## # A tibble: 12 x 5
##    site  experiment length width height
##    <fct> <fct>       <dbl> <dbl>  <dbl>
##  1 1     1             2.2   1.3    9.6
##  2 1     2             2.1   2.2    7.6
##  3 1     3             2.7   1.5    2.2
##  4 2     1             3     4.5    1.5
##  5 2     2             3.1   3.1    4
##  6 2     3             2.5   2.8    3
##  7 3     1             1.9   1.8    4.5
##  8 3     2             1.1   0.5    2.3
##  9 3     3             3.5   2      7.5
## 10 4     1             2.9   2.7    3.2
## 11 4     2             4.5   4.8    6.5
## 12 4     3             1.2   1.8    2.7
```







Ex.20)

Expected output:

```
## # A tibble: 3 x 4
##   experiment     N Range_length Range_width
##   <fct>      <int>        <dbl>       <dbl>
## 1 1              4          1.1         3.2
## 2 2              4          3.4         4.3
## 3 3              4          2.3         1.3
```

Ex.21)

Expected output:

```
## # A tibble: 4 x 6
##   site  experiment length width height  area
##   <fct> <fct>       <dbl> <dbl>  <dbl> <dbl>
## 1 1     2             2.1   2.2    7.6  4.62
## 2 1     1             2.2   1.3    9.6  2.86
## 3 3     3             3.5   2      7.5  7
## 4 4     2             4.5   4.8    6.5 21.6
```

Ex.22)

Expected output:

```
## # A tibble: 2 x 5
##   site  experiment length width height
##   <fct> <fct>       <dbl> <dbl>  <dbl>
## 1 1     2             2.1   2.2    7.6
## 2 4     2             4.5   4.8    6.5
```

Ex.23)

Expected output:

```
## # A tibble: 8 x 5
##   site  experiment length width height
##   <fct> <fct>       <dbl> <dbl>  <dbl>
## 1 1     1             2.2   1.3    9.6
## 2 1     2             2.1   2.2    7.6
## 3 2     1             3     4.5    1.5
## 4 2     2             3.1   3.1    4
## 5 3     1             1.9   1.8    4.5
## 6 3     2             1.1   0.5    2.3
## 7 4     1             2.9   2.7    3.2
## 8 4     2             4.5   4.8    6.5
```

Ex.24

Expected output:

```
## # A tibble: 12 x 5
##     site experiment length width height
##    <dbl>      <dbl>  <dbl> <dbl>  <dbl>
##  1     1          1    2.2   1.3    9.6
##  2     1          2    2.1   2.2    7.6
##  3     1          3    2.7   1.5    2.2
##  4     2          1    3     4.5    1.5
##  5     2          2    3.1   3.1    4
##  6     2          3    2.5   2.8    3
##  7     3          1    1.9   1.8    4.5
##  8     3          2    1.1   0.5    2.3
##  9     3          3    3.5   2      7.5
## 10     4          1    2.9   2.7    3.2
## 11     4          2    4.5   4.8    6.5
## 12     4          3    1.2   1.8    2.7
```

Ex. 25)

Expected output:

```
## # A tibble: 12 x 7
##     site experiment length width height  area volume
##    <dbl>      <dbl>  <dbl> <dbl>  <dbl> <dbl>  <dbl>
##  1     1          1    2.2   1.3    9.6  2.86  27.5
##  2     1          2    2.1   2.2    7.6  4.62  35.1
##  3     1          3    2.7   1.5    2.2  4.05   8.91
##  4     2          1    3     4.5    1.5 13.5   20.2
##  5     2          2    3.1   3.1    4    9.61  38.4
##  6     2          3    2.5   2.8    3    7     21
##  7     3          1    1.9   1.8    4.5  3.42  15.4
##  8     3          2    1.1   0.5    2.3  0.55   1.26
##  9     3          3    3.5   2      7.5  7     52.5
## 10     4          1    2.9   2.7    3.2  7.83  25.1
## 11     4          2    4.5   4.8    6.5 21.6  140.
## 12     4          3    1.2   1.8    2.7  2.16   5.83
```