Stat123 Assignment #3

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```
library(tidyverse) #observe which packages are loaded any potential conflicts
```

```
Warning: package 'lubridate' was built under R version 4.3.3
```

```
── Attaching core tidyverse packages ──────────────────────── tidyverse 2.0.0
──
✔ dplyr     1.1.4     ✔ readr     2.1.5
✔ forcats   1.0.0     ✔ stringr   1.5.1
✔ ggplot2   3.5.1     ✔ tibble    3.2.1
✔ lubridate 1.9.4     ✔ tidyr     1.3.1
✔ purrr     1.0.2
── Conflicts ────────────────────────────────────────── tidyverse_conflicts()
──
✖ dplyr::filter() masks stats::filter()
✖ dplyr::lag()    masks stats::lag()
ℹ Use the conflicted package (<http://conflicted.r-lib.org/>) to force all
conflicts to become errors
```

```
library(nycflights13)
library(gapminder)
library(ggplot2)
set.seed(42)
age = sample(18:65, 50, replace = TRUE)
height = runif(50, 150, 190)
weight = runif(50,45,100)
gender = sample(c("Male", "Female"), 50, replace = TRUE)
data = data.frame(Age = age, Height = height, Weight = weight, Gender =
gender)
```

Question 1

```
#a)
data |>
  select(Age, Height)
```

```
   Age   Height
1   54 170.5765
2   18 177.0243
3   42 189.3127
4   27 180.3818
5   53 172.6595
6   35 183.9876
7   64 157.5790
8   41 160.8515
```

```
9   24 183.1263
10  53 177.7282
11  42 159.6218
12  54 151.7196
13  63 155.6192
14  37 158.6554
15  43 169.1759
16  64 157.8964
17  20 178.7742
18  58 150.3154
19  42 165.0196
20  44 170.5763
21  53 150.0628
22  54 173.2642
23  48 156.3162
24  62 164.3611
25  22 175.8253
26  37 181.0329
27  51 172.5459
28  45 159.3481
29  57 153.5992
30  20 153.4245
31  50 162.2087
32  59 176.6971
33  41 150.0096
34  47 158.3428
35  60 187.3214
36  32 187.0258
37  39 179.3638
38  25 163.3229
39  53 170.6025
40  21 179.7590
41  39 174.7664
42  35 175.0498
43  62 158.6863
44  45 158.6627
45  22 165.5578
46  21 187.6982
47  51 188.5043
48  52 179.5942
49  41 179.3298
50  40 171.4305

#b)
data |>
  filter(Age > 30)

   Age   Height   Weight Gender
1   54 170.5765 45.12501 Female
2   42 189.3127 91.02409 Female
```

```
3   53 172.6595 69.90024   Male
4   35 183.9876 74.46845 Female
5   64 157.5790 74.55572 Female
6   41 160.8515 45.07595   Male
7   53 177.7282 78.66732 Female
8   42 159.6218 90.59182   Male
9   54 151.7196 64.61971 Female
10  63 155.6192 67.58493   Male
11  37 158.6554 76.54117 Female
12  43 169.1759 77.43231 Female
13  64 157.8964 84.58115   Male
14  58 150.3154 95.55622   Male
15  42 165.0196 97.94137 Female
16  44 170.5763 57.84379 Female
17  53 150.0628 84.84737 Female
18  54 173.2642 94.69990 Female
19  48 156.3162 78.19107 Female
20  62 164.3611 79.73290 Female
21  37 181.0329 91.77655 Female
22  51 172.5459 76.89015 Female
23  45 159.3481 90.17722 Female
24  57 153.5992 51.25452   Male
25  50 162.2087 79.29874 Female
26  59 176.6971 53.16456   Male
27  41 150.0096 49.41455 Female
28  47 158.3428 70.52383 Female
29  60 187.3214 87.86525 Female
30  32 187.0258 85.34404 Female
31  39 179.3638 89.94767 Female
32  53 170.6025 96.95962   Male
33  39 174.7664 53.19896 Female
34  35 175.0498 84.56582 Female
35  62 158.6863 62.82473 Female
36  45 158.6627 87.83452   Male
37  51 188.5043 87.67038   Male
38  52 179.5942 55.33280 Female
39  41 179.3298 46.59972 Female
40  40 171.4305 52.46426 Female
```

```r
#c)
data |>
  arrange(desc(Height))
```

```
   Age   Height   Weight Gender
1   42 189.3127 91.02409 Female
2   51 188.5043 87.67038   Male
3   21 187.6982 82.32261   Male
4   60 187.3214 87.86525 Female
5   32 187.0258 85.34404 Female
6   35 183.9876 74.46845 Female
```

```
7   24 183.1263 64.56163   Male
8   37 181.0329 91.77655 Female
9   27 180.3818 86.33374 Female
10  21 179.7590 61.14931 Female
11  52 179.5942 55.33280 Female
12  39 179.3638 89.94767 Female
13  41 179.3298 46.59972 Female
14  20 178.7742 66.72352 Female
15  53 177.7282 78.66732 Female
16  18 177.0243 78.49156   Male
17  59 176.6971 53.16456   Male
18  22 175.8253 96.55622   Male
19  35 175.0498 84.56582 Female
20  39 174.7664 53.19896 Female
21  54 173.2642 94.69990 Female
22  53 172.6595 69.90024   Male
23  51 172.5459 76.89015 Female
24  40 171.4305 52.46426 Female
25  53 170.6025 96.95962   Male
26  54 170.5765 45.12501 Female
27  44 170.5763 57.84379 Female
28  43 169.1759 77.43231 Female
29  22 165.5578 66.69426 Female
30  42 165.0196 97.94137 Female
31  62 164.3611 79.73290 Female
32  25 163.3229 54.35894   Male
33  50 162.2087 79.29874 Female
34  41 160.8515 45.07595   Male
35  42 159.6218 90.59182   Male
36  45 159.3481 90.17722 Female
37  62 158.6863 62.82473 Female
38  45 158.6627 87.83452   Male
39  37 158.6554 76.54117 Female
40  47 158.3428 70.52383 Female
41  64 157.8964 84.58115   Male
42  64 157.5790 74.55572 Female
43  48 156.3162 78.19107 Female
44  63 155.6192 67.58493   Male
45  57 153.5992 51.25452   Male
46  20 153.4245 87.04793 Female
47  54 151.7196 64.61971 Female
48  58 150.3154 95.55622   Male
49  53 150.0628 84.84737 Female
50  41 150.0096 49.41455 Female

#d)
data |>
  summarize(mean_age = mean(Age), median_age = median(Age), sd_age = sd(Age),
var_age = var(Age))
```

```
  mean_age median_age   sd_age  var_age
1    43.24       43.5 13.46888 181.4106
```

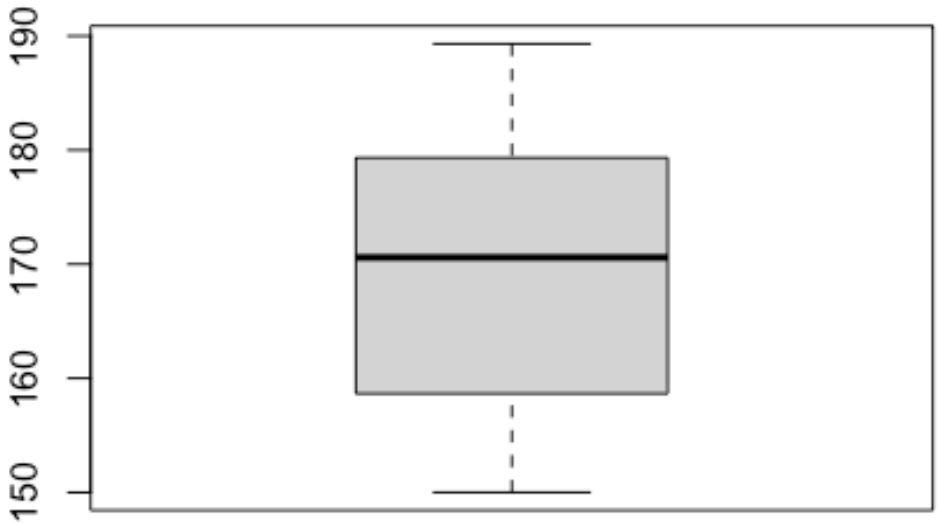
```r
#e)
data |>
  summarize(Q1 = quantile(Height, 0.25), Q2 = quantile(Height, 0.75))
```

```
       Q1       Q2
1 158.6686 179.1909
```

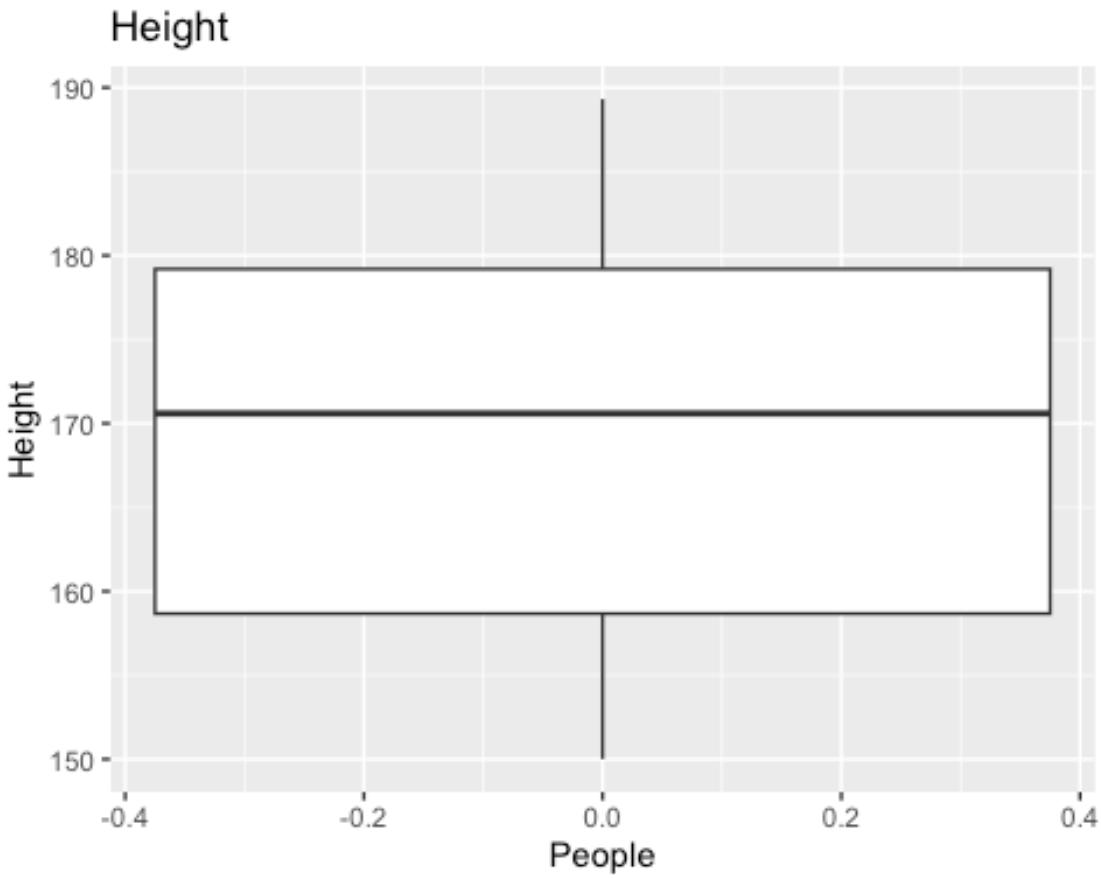
```r
# or just quantile(Height, c(0.25, 0.75))
#f)
quantile(data$Weight)
```

```
      0%      25%      50%      75%     100%
45.07595 63.25895 77.81169 87.51476 97.94137
```

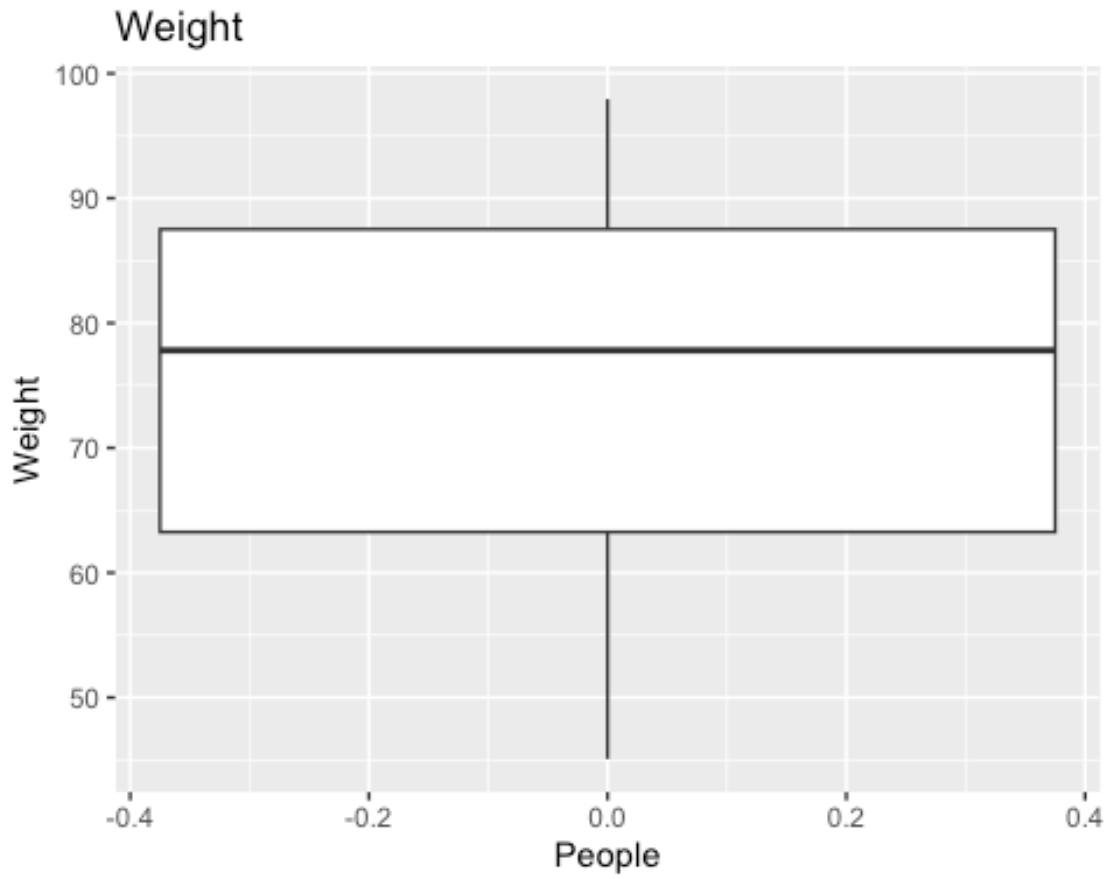
```r
#g)
boxplot(data$Height)
```




```r
#h)
ggplot(data = data, aes(, y = Height)) + geom_boxplot() + ggtitle("Height") +
labs(x = "People")
```

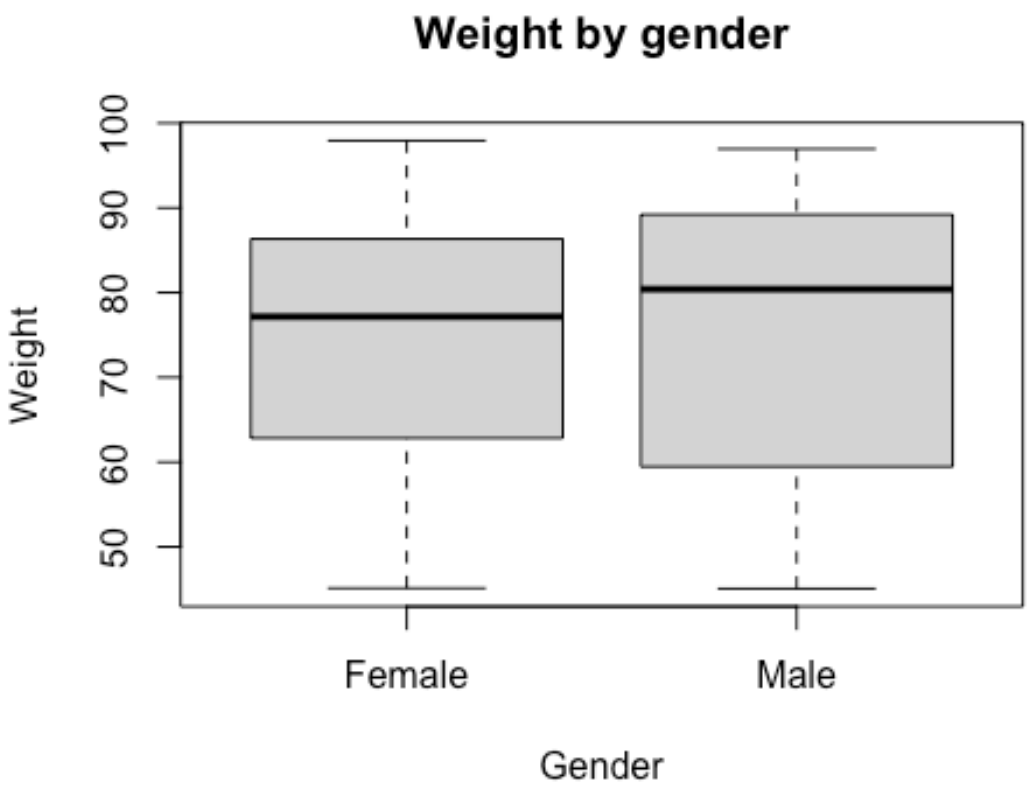



```
ggplot(data = data, aes(, y = Weight)) + geom_boxplot() + ggtitle("Weight") +
labs(x = "People")
```



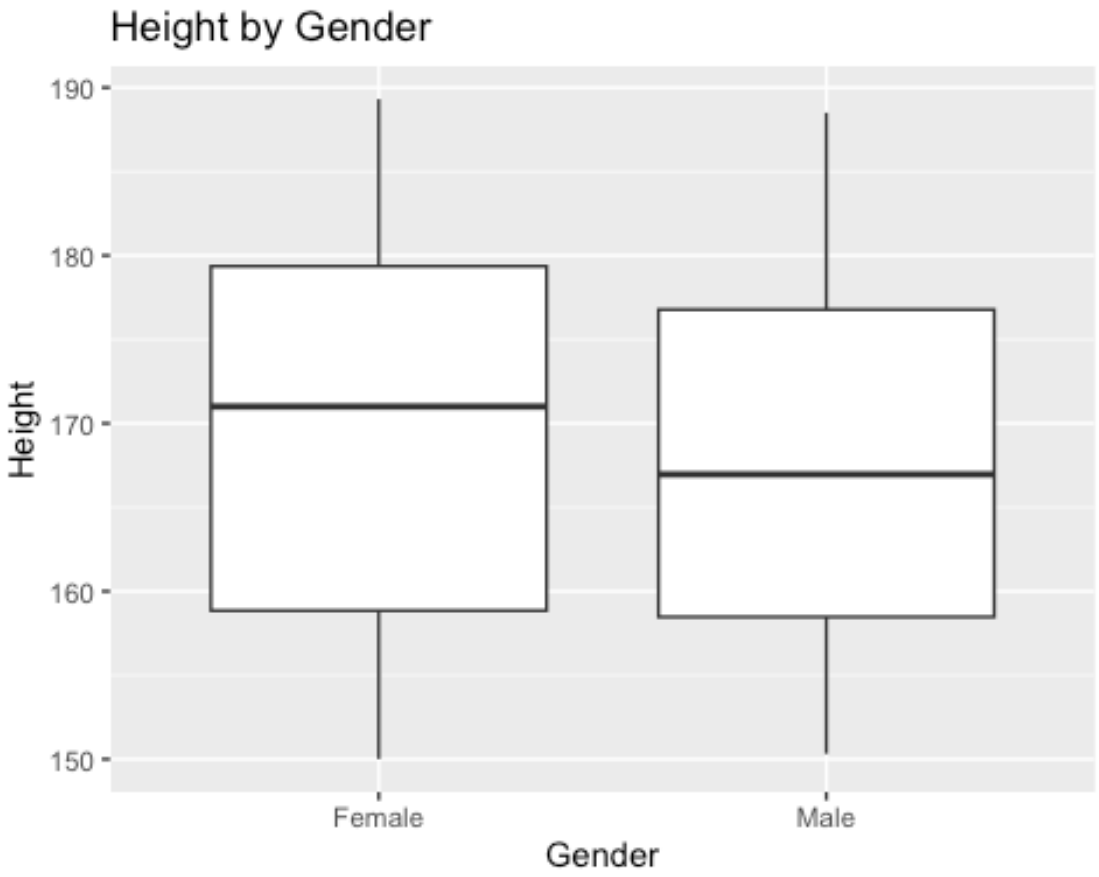

```r
#i)
boxplot(Height ~ Gender, data = data, main = "Height by gender")
```


```
boxplot(Weight ~ Gender, data = data, main = "Weight by gender")
```




```
#j)
ggplot(data = data, aes(x = as.factor(data$Gender), y = Height)) +
geom_boxplot() + ggtitle("Height by Gender") + labs(x = "Gender")
```

```
Warning: Use of `data$Gender` is discouraged.
ℹ Use `Gender` instead.
```


Height by Gender
190
180
170
160
150
Height
Female
Male
Gender

Question 2

```r
#a
data <- iris
data |>
  rename(iris.Species = Species)
```

```
    Sepal.Length Sepal.Width Petal.Length Petal.Width iris.Species
1            5.1         3.5          1.4         0.2       setosa
2            4.9         3.0          1.4         0.2       setosa
3            4.7         3.2          1.3         0.2       setosa
4            4.6         3.1          1.5         0.2       setosa
5            5.0         3.6          1.4         0.2       setosa
6            5.4         3.9          1.7         0.4       setosa
7            4.6         3.4          1.4         0.3       setosa
8            5.0         3.4          1.5         0.2       setosa
9            4.4         2.9          1.4         0.2       setosa
10           4.9         3.1          1.5         0.1       setosa
11           5.4         3.7          1.5         0.2       setosa
12           4.8         3.4          1.6         0.2       setosa
13           4.8         3.0          1.4         0.1       setosa
14           4.3         3.0          1.1         0.1       setosa
15           5.8         4.0          1.2         0.2       setosa
16           5.7         4.4          1.5         0.4       setosa
17           5.4         3.9          1.3         0.4       setosa
18           5.1         3.5          1.4         0.3       setosa
19           5.7         3.8          1.7         0.3       setosa
20           5.1         3.8          1.5         0.3       setosa
21           5.4         3.4          1.7         0.2       setosa
22           5.1         3.7          1.5         0.4       setosa
23           4.6         3.6          1.0         0.2       setosa
24           5.1         3.3          1.7         0.5       setosa
25           4.8         3.4          1.9         0.2       setosa
26           5.0         3.0          1.6         0.2       setosa
27           5.0         3.4          1.6         0.4       setosa
28           5.2         3.5          1.5         0.2       setosa
29           5.2         3.4          1.4         0.2       setosa
30           4.7         3.2          1.6         0.2       setosa
31           4.8         3.1          1.6         0.2       setosa
32           5.4         3.4          1.5         0.4       setosa
33           5.2         4.1          1.5         0.1       setosa
34           5.5         4.2          1.4         0.2       setosa
35           4.9         3.1          1.5         0.2       setosa
36           5.0         3.2          1.2         0.2       setosa
37           5.5         3.5          1.3         0.2       setosa
38           4.9         3.6          1.4         0.1       setosa
39           4.4         3.0          1.3         0.2       setosa
40           5.1         3.4          1.5         0.2       setosa
41           5.0         3.5          1.3         0.3       setosa
42           4.5         2.3          1.3         0.3       setosa
```

43	4.4	3.2	1.3	0.2	setosa
44	5.0	3.5	1.6	0.6	setosa
45	5.1	3.8	1.9	0.4	setosa
46	4.8	3.0	1.4	0.3	setosa
47	5.1	3.8	1.6	0.2	setosa
48	4.6	3.2	1.4	0.2	setosa
49	5.3	3.7	1.5	0.2	setosa
50	5.0	3.3	1.4	0.2	setosa
51	7.0	3.2	4.7	1.4	versicolor
52	6.4	3.2	4.5	1.5	versicolor
53	6.9	3.1	4.9	1.5	versicolor
54	5.5	2.3	4.0	1.3	versicolor
55	6.5	2.8	4.6	1.5	versicolor
56	5.7	2.8	4.5	1.3	versicolor
57	6.3	3.3	4.7	1.6	versicolor
58	4.9	2.4	3.3	1.0	versicolor
59	6.6	2.9	4.6	1.3	versicolor
60	5.2	2.7	3.9	1.4	versicolor
61	5.0	2.0	3.5	1.0	versicolor
62	5.9	3.0	4.2	1.5	versicolor
63	6.0	2.2	4.0	1.0	versicolor
64	6.1	2.9	4.7	1.4	versicolor
65	5.6	2.9	3.6	1.3	versicolor
66	6.7	3.1	4.4	1.4	versicolor
67	5.6	3.0	4.5	1.5	versicolor
68	5.8	2.7	4.1	1.0	versicolor
69	6.2	2.2	4.5	1.5	versicolor
70	5.6	2.5	3.9	1.1	versicolor
71	5.9	3.2	4.8	1.8	versicolor
72	6.1	2.8	4.0	1.3	versicolor
73	6.3	2.5	4.9	1.5	versicolor
74	6.1	2.8	4.7	1.2	versicolor
75	6.4	2.9	4.3	1.3	versicolor
76	6.6	3.0	4.4	1.4	versicolor
77	6.8	2.8	4.8	1.4	versicolor
78	6.7	3.0	5.0	1.7	versicolor
79	6.0	2.9	4.5	1.5	versicolor
80	5.7	2.6	3.5	1.0	versicolor
81	5.5	2.4	3.8	1.1	versicolor
82	5.5	2.4	3.7	1.0	versicolor
83	5.8	2.7	3.9	1.2	versicolor
84	6.0	2.7	5.1	1.6	versicolor
85	5.4	3.0	4.5	1.5	versicolor
86	6.0	3.4	4.5	1.6	versicolor
87	6.7	3.1	4.7	1.5	versicolor
88	6.3	2.3	4.4	1.3	versicolor
89	5.6	3.0	4.1	1.3	versicolor
90	5.5	2.5	4.0	1.3	versicolor
91	5.5	2.6	4.4	1.2	versicolor
92	6.1	3.0	4.6	1.4	versicolor

93	5.8	2.6	4.0	1.2	versicolor
94	5.0	2.3	3.3	1.0	versicolor
95	5.6	2.7	4.2	1.3	versicolor
96	5.7	3.0	4.2	1.2	versicolor
97	5.7	2.9	4.2	1.3	versicolor
98	6.2	2.9	4.3	1.3	versicolor
99	5.1	2.5	3.0	1.1	versicolor
100	5.7	2.8	4.1	1.3	versicolor
101	6.3	3.3	6.0	2.5	virginica
102	5.8	2.7	5.1	1.9	virginica
103	7.1	3.0	5.9	2.1	virginica
104	6.3	2.9	5.6	1.8	virginica
105	6.5	3.0	5.8	2.2	virginica
106	7.6	3.0	6.6	2.1	virginica
107	4.9	2.5	4.5	1.7	virginica
108	7.3	2.9	6.3	1.8	virginica
109	6.7	2.5	5.8	1.8	virginica
110	7.2	3.6	6.1	2.5	virginica
111	6.5	3.2	5.1	2.0	virginica
112	6.4	2.7	5.3	1.9	virginica
113	6.8	3.0	5.5	2.1	virginica
114	5.7	2.5	5.0	2.0	virginica
115	5.8	2.8	5.1	2.4	virginica
116	6.4	3.2	5.3	2.3	virginica
117	6.5	3.0	5.5	1.8	virginica
118	7.7	3.8	6.7	2.2	virginica
119	7.7	2.6	6.9	2.3	virginica
120	6.0	2.2	5.0	1.5	virginica
121	6.9	3.2	5.7	2.3	virginica
122	5.6	2.8	4.9	2.0	virginica
123	7.7	2.8	6.7	2.0	virginica
124	6.3	2.7	4.9	1.8	virginica
125	6.7	3.3	5.7	2.1	virginica
126	7.2	3.2	6.0	1.8	virginica
127	6.2	2.8	4.8	1.8	virginica
128	6.1	3.0	4.9	1.8	virginica
129	6.4	2.8	5.6	2.1	virginica
130	7.2	3.0	5.8	1.6	virginica
131	7.4	2.8	6.1	1.9	virginica
132	7.9	3.8	6.4	2.0	virginica
133	6.4	2.8	5.6	2.2	virginica
134	6.3	2.8	5.1	1.5	virginica
135	6.1	2.6	5.6	1.4	virginica
136	7.7	3.0	6.1	2.3	virginica
137	6.3	3.4	5.6	2.4	virginica
138	6.4	3.1	5.5	1.8	virginica
139	6.0	3.0	4.8	1.8	virginica
140	6.9	3.1	5.4	2.1	virginica
141	6.7	3.1	5.6	2.4	virginica
142	6.9	3.1	5.1	2.3	virginica

```
143          5.8         2.7          5.1         1.9    virginica
144          6.8         3.2          5.9         2.3    virginica
145          6.7         3.3          5.7         2.5    virginica
146          6.7         3.0          5.2         2.3    virginica
147          6.3         2.5          5.0         1.9    virginica
148          6.5         3.0          5.2         2.0    virginica
149          6.2         3.4          5.4         2.3    virginica
150          5.9         3.0          5.1         1.8    virginica
```

```
#b
data |>
  arrange(Sepal.Length)
```

```
    Sepal.Length Sepal.Width Petal.Length Petal.Width    Species
1            4.3         3.0          1.1         0.1     setosa
2            4.4         2.9          1.4         0.2     setosa
3            4.4         3.0          1.3         0.2     setosa
4            4.4         3.2          1.3         0.2     setosa
5            4.5         2.3          1.3         0.3     setosa
6            4.6         3.1          1.5         0.2     setosa
7            4.6         3.4          1.4         0.3     setosa
8            4.6         3.6          1.0         0.2     setosa
9            4.6         3.2          1.4         0.2     setosa
10           4.7         3.2          1.3         0.2     setosa
11           4.7         3.2          1.6         0.2     setosa
12           4.8         3.4          1.6         0.2     setosa
13           4.8         3.0          1.4         0.1     setosa
14           4.8         3.4          1.9         0.2     setosa
15           4.8         3.1          1.6         0.2     setosa
16           4.8         3.0          1.4         0.3     setosa
17           4.9         3.0          1.4         0.2     setosa
18           4.9         3.1          1.5         0.1     setosa
19           4.9         3.1          1.5         0.2     setosa
20           4.9         3.6          1.4         0.1     setosa
21           4.9         2.4          3.3         1.0 versicolor
22           4.9         2.5          4.5         1.7  virginica
23           5.0         3.6          1.4         0.2     setosa
24           5.0         3.4          1.5         0.2     setosa
25           5.0         3.0          1.6         0.2     setosa
26           5.0         3.4          1.6         0.4     setosa
27           5.0         3.2          1.2         0.2     setosa
28           5.0         3.5          1.3         0.3     setosa
29           5.0         3.5          1.6         0.6     setosa
30           5.0         3.3          1.4         0.2     setosa
31           5.0         2.0          3.5         1.0 versicolor
32           5.0         2.3          3.3         1.0 versicolor
33           5.1         3.5          1.4         0.2     setosa
34           5.1         3.5          1.4         0.3     setosa
35           5.1         3.8          1.5         0.3     setosa
36           5.1         3.7          1.5         0.4     setosa
```

37	5.1	3.3	1.7	0.5	setosa
38	5.1	3.4	1.5	0.2	setosa
39	5.1	3.8	1.9	0.4	setosa
40	5.1	3.8	1.6	0.2	setosa
41	5.1	2.5	3.0	1.1	versicolor
42	5.2	3.5	1.5	0.2	setosa
43	5.2	3.4	1.4	0.2	setosa
44	5.2	4.1	1.5	0.1	setosa
45	5.2	2.7	3.9	1.4	versicolor
46	5.3	3.7	1.5	0.2	setosa
47	5.4	3.9	1.7	0.4	setosa
48	5.4	3.7	1.5	0.2	setosa
49	5.4	3.9	1.3	0.4	setosa
50	5.4	3.4	1.7	0.2	setosa
51	5.4	3.4	1.5	0.4	setosa
52	5.4	3.0	4.5	1.5	versicolor
53	5.5	4.2	1.4	0.2	setosa
54	5.5	3.5	1.3	0.2	setosa
55	5.5	2.3	4.0	1.3	versicolor
56	5.5	2.4	3.8	1.1	versicolor
57	5.5	2.4	3.7	1.0	versicolor
58	5.5	2.5	4.0	1.3	versicolor
59	5.5	2.6	4.4	1.2	versicolor
60	5.6	2.9	3.6	1.3	versicolor
61	5.6	3.0	4.5	1.5	versicolor
62	5.6	2.5	3.9	1.1	versicolor
63	5.6	3.0	4.1	1.3	versicolor
64	5.6	2.7	4.2	1.3	versicolor
65	5.6	2.8	4.9	2.0	virginica
66	5.7	4.4	1.5	0.4	setosa
67	5.7	3.8	1.7	0.3	setosa
68	5.7	2.8	4.5	1.3	versicolor
69	5.7	2.6	3.5	1.0	versicolor
70	5.7	3.0	4.2	1.2	versicolor
71	5.7	2.9	4.2	1.3	versicolor
72	5.7	2.8	4.1	1.3	versicolor
73	5.7	2.5	5.0	2.0	virginica
74	5.8	4.0	1.2	0.2	setosa
75	5.8	2.7	4.1	1.0	versicolor
76	5.8	2.7	3.9	1.2	versicolor
77	5.8	2.6	4.0	1.2	versicolor
78	5.8	2.7	5.1	1.9	virginica
79	5.8	2.8	5.1	2.4	virginica
80	5.8	2.7	5.1	1.9	virginica
81	5.9	3.0	4.2	1.5	versicolor
82	5.9	3.2	4.8	1.8	versicolor
83	5.9	3.0	5.1	1.8	virginica
84	6.0	2.2	4.0	1.0	versicolor
85	6.0	2.9	4.5	1.5	versicolor
86	6.0	2.7	5.1	1.6	versicolor

87	6.0	3.4	4.5	1.6	versicolor
88	6.0	2.2	5.0	1.5	virginica
89	6.0	3.0	4.8	1.8	virginica
90	6.1	2.9	4.7	1.4	versicolor
91	6.1	2.8	4.0	1.3	versicolor
92	6.1	2.8	4.7	1.2	versicolor
93	6.1	3.0	4.6	1.4	versicolor
94	6.1	3.0	4.9	1.8	virginica
95	6.1	2.6	5.6	1.4	virginica
96	6.2	2.2	4.5	1.5	versicolor
97	6.2	2.9	4.3	1.3	versicolor
98	6.2	2.8	4.8	1.8	virginica
99	6.2	3.4	5.4	2.3	virginica
100	6.3	3.3	4.7	1.6	versicolor
101	6.3	2.5	4.9	1.5	versicolor
102	6.3	2.3	4.4	1.3	versicolor
103	6.3	3.3	6.0	2.5	virginica
104	6.3	2.9	5.6	1.8	virginica
105	6.3	2.7	4.9	1.8	virginica
106	6.3	2.8	5.1	1.5	virginica
107	6.3	3.4	5.6	2.4	virginica
108	6.3	2.5	5.0	1.9	virginica
109	6.4	3.2	4.5	1.5	versicolor
110	6.4	2.9	4.3	1.3	versicolor
111	6.4	2.7	5.3	1.9	virginica
112	6.4	3.2	5.3	2.3	virginica
113	6.4	2.8	5.6	2.1	virginica
114	6.4	2.8	5.6	2.2	virginica
115	6.4	3.1	5.5	1.8	virginica
116	6.5	2.8	4.6	1.5	versicolor
117	6.5	3.0	5.8	2.2	virginica
118	6.5	3.2	5.1	2.0	virginica
119	6.5	3.0	5.5	1.8	virginica
120	6.5	3.0	5.2	2.0	virginica
121	6.6	2.9	4.6	1.3	versicolor
122	6.6	3.0	4.4	1.4	versicolor
123	6.7	3.1	4.4	1.4	versicolor
124	6.7	3.0	5.0	1.7	versicolor
125	6.7	3.1	4.7	1.5	versicolor
126	6.7	2.5	5.8	1.8	virginica
127	6.7	3.3	5.7	2.1	virginica
128	6.7	3.1	5.6	2.4	virginica
129	6.7	3.3	5.7	2.5	virginica
130	6.7	3.0	5.2	2.3	virginica
131	6.8	2.8	4.8	1.4	versicolor
132	6.8	3.0	5.5	2.1	virginica
133	6.8	3.2	5.9	2.3	virginica
134	6.9	3.1	4.9	1.5	versicolor
135	6.9	3.2	5.7	2.3	virginica
136	6.9	3.1	5.4	2.1	virginica

```
137          6.9         3.1          5.1         2.3  virginica
138          7.0         3.2          4.7         1.4 versicolor
139          7.1         3.0          5.9         2.1  virginica
140          7.2         3.6          6.1         2.5  virginica
141          7.2         3.2          6.0         1.8  virginica
142          7.2         3.0          5.8         1.6  virginica
143          7.3         2.9          6.3         1.8  virginica
144          7.4         2.8          6.1         1.9  virginica
145          7.6         3.0          6.6         2.1  virginica
146          7.7         3.8          6.7         2.2  virginica
147          7.7         2.6          6.9         2.3  virginica
148          7.7         2.8          6.7         2.0  virginica
149          7.7         3.0          6.1         2.3  virginica
150          7.9         3.8          6.4         2.0  virginica
```

```
#c
data |>
  mutate(Ratio = Sepal.Width/Petal.Width)
```

```
    Sepal.Length Sepal.Width Petal.Length Petal.Width    Species     Ratio
1            5.1         3.5          1.4         0.2     setosa 17.500000
2            4.9         3.0          1.4         0.2     setosa 15.000000
3            4.7         3.2          1.3         0.2     setosa 16.000000
4            4.6         3.1          1.5         0.2     setosa 15.500000
5            5.0         3.6          1.4         0.2     setosa 18.000000
6            5.4         3.9          1.7         0.4     setosa  9.750000
7            4.6         3.4          1.4         0.3     setosa 11.333333
8            5.0         3.4          1.5         0.2     setosa 17.000000
9            4.4         2.9          1.4         0.2     setosa 14.500000
10           4.9         3.1          1.5         0.1     setosa 31.000000
11           5.4         3.7          1.5         0.2     setosa 18.500000
12           4.8         3.4          1.6         0.2     setosa 17.000000
13           4.8         3.0          1.4         0.1     setosa 30.000000
14           4.3         3.0          1.1         0.1     setosa 30.000000
15           5.8         4.0          1.2         0.2     setosa 20.000000
16           5.7         4.4          1.5         0.4     setosa 11.000000
17           5.4         3.9          1.3         0.4     setosa  9.750000
18           5.1         3.5          1.4         0.3     setosa 11.666667
19           5.7         3.8          1.7         0.3     setosa 12.666667
20           5.1         3.8          1.5         0.3     setosa 12.666667
21           5.4         3.4          1.7         0.2     setosa 17.000000
22           5.1         3.7          1.5         0.4     setosa  9.250000
23           4.6         3.6          1.0         0.2     setosa 18.000000
24           5.1         3.3          1.7         0.5     setosa  6.600000
25           4.8         3.4          1.9         0.2     setosa 17.000000
26           5.0         3.0          1.6         0.2     setosa 15.000000
27           5.0         3.4          1.6         0.4     setosa  8.500000
28           5.2         3.5          1.5         0.2     setosa 17.500000
29           5.2         3.4          1.4         0.2     setosa 17.000000
30           4.7         3.2          1.6         0.2     setosa 16.000000
```

31	4.8	3.1	1.6	0.2	setosa	15.500000
32	5.4	3.4	1.5	0.4	setosa	8.500000
33	5.2	4.1	1.5	0.1	setosa	41.000000
34	5.5	4.2	1.4	0.2	setosa	21.000000
35	4.9	3.1	1.5	0.2	setosa	15.500000
36	5.0	3.2	1.2	0.2	setosa	16.000000
37	5.5	3.5	1.3	0.2	setosa	17.500000
38	4.9	3.6	1.4	0.1	setosa	36.000000
39	4.4	3.0	1.3	0.2	setosa	15.000000
40	5.1	3.4	1.5	0.2	setosa	17.000000
41	5.0	3.5	1.3	0.3	setosa	11.666667
42	4.5	2.3	1.3	0.3	setosa	7.666667
43	4.4	3.2	1.3	0.2	setosa	16.000000
44	5.0	3.5	1.6	0.6	setosa	5.833333
45	5.1	3.8	1.9	0.4	setosa	9.500000
46	4.8	3.0	1.4	0.3	setosa	10.000000
47	5.1	3.8	1.6	0.2	setosa	19.000000
48	4.6	3.2	1.4	0.2	setosa	16.000000
49	5.3	3.7	1.5	0.2	setosa	18.500000
50	5.0	3.3	1.4	0.2	setosa	16.500000
51	7.0	3.2	4.7	1.4	versicolor	2.285714
52	6.4	3.2	4.5	1.5	versicolor	2.133333
53	6.9	3.1	4.9	1.5	versicolor	2.066667
54	5.5	2.3	4.0	1.3	versicolor	1.769231
55	6.5	2.8	4.6	1.5	versicolor	1.866667
56	5.7	2.8	4.5	1.3	versicolor	2.153846
57	6.3	3.3	4.7	1.6	versicolor	2.062500
58	4.9	2.4	3.3	1.0	versicolor	2.400000
59	6.6	2.9	4.6	1.3	versicolor	2.230769
60	5.2	2.7	3.9	1.4	versicolor	1.928571
61	5.0	2.0	3.5	1.0	versicolor	2.000000
62	5.9	3.0	4.2	1.5	versicolor	2.000000
63	6.0	2.2	4.0	1.0	versicolor	2.200000
64	6.1	2.9	4.7	1.4	versicolor	2.071429
65	5.6	2.9	3.6	1.3	versicolor	2.230769
66	6.7	3.1	4.4	1.4	versicolor	2.214286
67	5.6	3.0	4.5	1.5	versicolor	2.000000
68	5.8	2.7	4.1	1.0	versicolor	2.700000
69	6.2	2.2	4.5	1.5	versicolor	1.466667
70	5.6	2.5	3.9	1.1	versicolor	2.272727
71	5.9	3.2	4.8	1.8	versicolor	1.777778
72	6.1	2.8	4.0	1.3	versicolor	2.153846
73	6.3	2.5	4.9	1.5	versicolor	1.666667
74	6.1	2.8	4.7	1.2	versicolor	2.333333
75	6.4	2.9	4.3	1.3	versicolor	2.230769
76	6.6	3.0	4.4	1.4	versicolor	2.142857
77	6.8	2.8	4.8	1.4	versicolor	2.000000
78	6.7	3.0	5.0	1.7	versicolor	1.764706
79	6.0	2.9	4.5	1.5	versicolor	1.933333
80	5.7	2.6	3.5	1.0	versicolor	2.600000

81	5.5	2.4	3.8	1.1	versicolor	2.181818
82	5.5	2.4	3.7	1.0	versicolor	2.400000
83	5.8	2.7	3.9	1.2	versicolor	2.250000
84	6.0	2.7	5.1	1.6	versicolor	1.687500
85	5.4	3.0	4.5	1.5	versicolor	2.000000
86	6.0	3.4	4.5	1.6	versicolor	2.125000
87	6.7	3.1	4.7	1.5	versicolor	2.066667
88	6.3	2.3	4.4	1.3	versicolor	1.769231
89	5.6	3.0	4.1	1.3	versicolor	2.307692
90	5.5	2.5	4.0	1.3	versicolor	1.923077
91	5.5	2.6	4.4	1.2	versicolor	2.166667
92	6.1	3.0	4.6	1.4	versicolor	2.142857
93	5.8	2.6	4.0	1.2	versicolor	2.166667
94	5.0	2.3	3.3	1.0	versicolor	2.300000
95	5.6	2.7	4.2	1.3	versicolor	2.076923
96	5.7	3.0	4.2	1.2	versicolor	2.500000
97	5.7	2.9	4.2	1.3	versicolor	2.230769
98	6.2	2.9	4.3	1.3	versicolor	2.230769
99	5.1	2.5	3.0	1.1	versicolor	2.272727
100	5.7	2.8	4.1	1.3	versicolor	2.153846
101	6.3	3.3	6.0	2.5	virginica	1.320000
102	5.8	2.7	5.1	1.9	virginica	1.421053
103	7.1	3.0	5.9	2.1	virginica	1.428571
104	6.3	2.9	5.6	1.8	virginica	1.611111
105	6.5	3.0	5.8	2.2	virginica	1.363636
106	7.6	3.0	6.6	2.1	virginica	1.428571
107	4.9	2.5	4.5	1.7	virginica	1.470588
108	7.3	2.9	6.3	1.8	virginica	1.611111
109	6.7	2.5	5.8	1.8	virginica	1.388889
110	7.2	3.6	6.1	2.5	virginica	1.440000
111	6.5	3.2	5.1	2.0	virginica	1.600000
112	6.4	2.7	5.3	1.9	virginica	1.421053
113	6.8	3.0	5.5	2.1	virginica	1.428571
114	5.7	2.5	5.0	2.0	virginica	1.250000
115	5.8	2.8	5.1	2.4	virginica	1.166667
116	6.4	3.2	5.3	2.3	virginica	1.391304
117	6.5	3.0	5.5	1.8	virginica	1.666667
118	7.7	3.8	6.7	2.2	virginica	1.727273
119	7.7	2.6	6.9	2.3	virginica	1.130435
120	6.0	2.2	5.0	1.5	virginica	1.466667
121	6.9	3.2	5.7	2.3	virginica	1.391304
122	5.6	2.8	4.9	2.0	virginica	1.400000
123	7.7	2.8	6.7	2.0	virginica	1.400000
124	6.3	2.7	4.9	1.8	virginica	1.500000
125	6.7	3.3	5.7	2.1	virginica	1.571429
126	7.2	3.2	6.0	1.8	virginica	1.777778
127	6.2	2.8	4.8	1.8	virginica	1.555556
128	6.1	3.0	4.9	1.8	virginica	1.666667
129	6.4	2.8	5.6	2.1	virginica	1.333333
130	7.2	3.0	5.8	1.6	virginica	1.875000

```
131          7.4         2.8          6.1         1.9  virginica  1.473684
132          7.9         3.8          6.4         2.0  virginica  1.900000
133          6.4         2.8          5.6         2.2  virginica  1.272727
134          6.3         2.8          5.1         1.5  virginica  1.866667
135          6.1         2.6          5.6         1.4  virginica  1.857143
136          7.7         3.0          6.1         2.3  virginica  1.304348
137          6.3         3.4          5.6         2.4  virginica  1.416667
138          6.4         3.1          5.5         1.8  virginica  1.722222
139          6.0         3.0          4.8         1.8  virginica  1.666667
140          6.9         3.1          5.4         2.1  virginica  1.476190
141          6.7         3.1          5.6         2.4  virginica  1.291667
142          6.9         3.1          5.1         2.3  virginica  1.347826
143          5.8         2.7          5.1         1.9  virginica  1.421053
144          6.8         3.2          5.9         2.3  virginica  1.391304
145          6.7         3.3          5.7         2.5  virginica  1.320000
146          6.7         3.0          5.2         2.3  virginica  1.304348
147          6.3         2.5          5.0         1.9  virginica  1.315789
148          6.5         3.0          5.2         2.0  virginica  1.500000
149          6.2         3.4          5.4         2.3  virginica  1.478261
150          5.9         3.0          5.1         1.8  virginica  1.666667
```

```
#d
data |>
  mutate(Ratio = Sepal.Width/Petal.Width) |>
  relocate(Ratio, .before = Sepal.Length)
```

```
        Ratio Sepal.Length Sepal.Width Petal.Length Petal.Width    Species
1   17.500000          5.1         3.5          1.4         0.2     setosa
2   15.000000          4.9         3.0          1.4         0.2     setosa
3   16.000000          4.7         3.2          1.3         0.2     setosa
4   15.500000          4.6         3.1          1.5         0.2     setosa
5   18.000000          5.0         3.6          1.4         0.2     setosa
6    9.750000          5.4         3.9          1.7         0.4     setosa
7   11.333333          4.6         3.4          1.4         0.3     setosa
8   17.000000          5.0         3.4          1.5         0.2     setosa
9   14.500000          4.4         2.9          1.4         0.2     setosa
10  31.000000          4.9         3.1          1.5         0.1     setosa
11  18.500000          5.4         3.7          1.5         0.2     setosa
12  17.000000          4.8         3.4          1.6         0.2     setosa
13  30.000000          4.8         3.0          1.4         0.1     setosa
14  30.000000          4.3         3.0          1.1         0.1     setosa
15  20.000000          5.8         4.0          1.2         0.2     setosa
16  11.000000          5.7         4.4          1.5         0.4     setosa
17   9.750000          5.4         3.9          1.3         0.4     setosa
18  11.666667          5.1         3.5          1.4         0.3     setosa
19  12.666667          5.7         3.8          1.7         0.3     setosa
20  12.666667          5.1         3.8          1.5         0.3     setosa
21  17.000000          5.4         3.4          1.7         0.2     setosa
22   9.250000          5.1         3.7          1.5         0.4     setosa
23  18.000000          4.6         3.6          1.0         0.2     setosa
```

24	6.600000	5.1	3.3	1.7	0.5	setosa
25	17.000000	4.8	3.4	1.9	0.2	setosa
26	15.000000	5.0	3.0	1.6	0.2	setosa
27	8.500000	5.0	3.4	1.6	0.4	setosa
28	17.500000	5.2	3.5	1.5	0.2	setosa
29	17.000000	5.2	3.4	1.4	0.2	setosa
30	16.000000	4.7	3.2	1.6	0.2	setosa
31	15.500000	4.8	3.1	1.6	0.2	setosa
32	8.500000	5.4	3.4	1.5	0.4	setosa
33	41.000000	5.2	4.1	1.5	0.1	setosa
34	21.000000	5.5	4.2	1.4	0.2	setosa
35	15.500000	4.9	3.1	1.5	0.2	setosa
36	16.000000	5.0	3.2	1.2	0.2	setosa
37	17.500000	5.5	3.5	1.3	0.2	setosa
38	36.000000	4.9	3.6	1.4	0.1	setosa
39	15.000000	4.4	3.0	1.3	0.2	setosa
40	17.000000	5.1	3.4	1.5	0.2	setosa
41	11.666667	5.0	3.5	1.3	0.3	setosa
42	7.666667	4.5	2.3	1.3	0.3	setosa
43	16.000000	4.4	3.2	1.3	0.2	setosa
44	5.833333	5.0	3.5	1.6	0.6	setosa
45	9.500000	5.1	3.8	1.9	0.4	setosa
46	10.000000	4.8	3.0	1.4	0.3	setosa
47	19.000000	5.1	3.8	1.6	0.2	setosa
48	16.000000	4.6	3.2	1.4	0.2	setosa
49	18.500000	5.3	3.7	1.5	0.2	setosa
50	16.500000	5.0	3.3	1.4	0.2	setosa
51	2.285714	7.0	3.2	4.7	1.4	versicolor
52	2.133333	6.4	3.2	4.5	1.5	versicolor
53	2.066667	6.9	3.1	4.9	1.5	versicolor
54	1.769231	5.5	2.3	4.0	1.3	versicolor
55	1.866667	6.5	2.8	4.6	1.5	versicolor
56	2.153846	5.7	2.8	4.5	1.3	versicolor
57	2.062500	6.3	3.3	4.7	1.6	versicolor
58	2.400000	4.9	2.4	3.3	1.0	versicolor
59	2.230769	6.6	2.9	4.6	1.3	versicolor
60	1.928571	5.2	2.7	3.9	1.4	versicolor
61	2.000000	5.0	2.0	3.5	1.0	versicolor
62	2.000000	5.9	3.0	4.2	1.5	versicolor
63	2.200000	6.0	2.2	4.0	1.0	versicolor
64	2.071429	6.1	2.9	4.7	1.4	versicolor
65	2.230769	5.6	2.9	3.6	1.3	versicolor
66	2.214286	6.7	3.1	4.4	1.4	versicolor
67	2.000000	5.6	3.0	4.5	1.5	versicolor
68	2.700000	5.8	2.7	4.1	1.0	versicolor
69	1.466667	6.2	2.2	4.5	1.5	versicolor
70	2.272727	5.6	2.5	3.9	1.1	versicolor
71	1.777778	5.9	3.2	4.8	1.8	versicolor
72	2.153846	6.1	2.8	4.0	1.3	versicolor
73	1.666667	6.3	2.5	4.9	1.5	versicolor

74	2.333333	6.1	2.8	4.7	1.2	versicolor
75	2.230769	6.4	2.9	4.3	1.3	versicolor
76	2.142857	6.6	3.0	4.4	1.4	versicolor
77	2.000000	6.8	2.8	4.8	1.4	versicolor
78	1.764706	6.7	3.0	5.0	1.7	versicolor
79	1.933333	6.0	2.9	4.5	1.5	versicolor
80	2.600000	5.7	2.6	3.5	1.0	versicolor
81	2.181818	5.5	2.4	3.8	1.1	versicolor
82	2.400000	5.5	2.4	3.7	1.0	versicolor
83	2.250000	5.8	2.7	3.9	1.2	versicolor
84	1.687500	6.0	2.7	5.1	1.6	versicolor
85	2.000000	5.4	3.0	4.5	1.5	versicolor
86	2.125000	6.0	3.4	4.5	1.6	versicolor
87	2.066667	6.7	3.1	4.7	1.5	versicolor
88	1.769231	6.3	2.3	4.4	1.3	versicolor
89	2.307692	5.6	3.0	4.1	1.3	versicolor
90	1.923077	5.5	2.5	4.0	1.3	versicolor
91	2.166667	5.5	2.6	4.4	1.2	versicolor
92	2.142857	6.1	3.0	4.6	1.4	versicolor
93	2.166667	5.8	2.6	4.0	1.2	versicolor
94	2.300000	5.0	2.3	3.3	1.0	versicolor
95	2.076923	5.6	2.7	4.2	1.3	versicolor
96	2.500000	5.7	3.0	4.2	1.2	versicolor
97	2.230769	5.7	2.9	4.2	1.3	versicolor
98	2.230769	6.2	2.9	4.3	1.3	versicolor
99	2.272727	5.1	2.5	3.0	1.1	versicolor
100	2.153846	5.7	2.8	4.1	1.3	versicolor
101	1.320000	6.3	3.3	6.0	2.5	virginica
102	1.421053	5.8	2.7	5.1	1.9	virginica
103	1.428571	7.1	3.0	5.9	2.1	virginica
104	1.611111	6.3	2.9	5.6	1.8	virginica
105	1.363636	6.5	3.0	5.8	2.2	virginica
106	1.428571	7.6	3.0	6.6	2.1	virginica
107	1.470588	4.9	2.5	4.5	1.7	virginica
108	1.611111	7.3	2.9	6.3	1.8	virginica
109	1.388889	6.7	2.5	5.8	1.8	virginica
110	1.440000	7.2	3.6	6.1	2.5	virginica
111	1.600000	6.5	3.2	5.1	2.0	virginica
112	1.421053	6.4	2.7	5.3	1.9	virginica
113	1.428571	6.8	3.0	5.5	2.1	virginica
114	1.250000	5.7	2.5	5.0	2.0	virginica
115	1.166667	5.8	2.8	5.1	2.4	virginica
116	1.391304	6.4	3.2	5.3	2.3	virginica
117	1.666667	6.5	3.0	5.5	1.8	virginica
118	1.727273	7.7	3.8	6.7	2.2	virginica
119	1.130435	7.7	2.6	6.9	2.3	virginica
120	1.466667	6.0	2.2	5.0	1.5	virginica
121	1.391304	6.9	3.2	5.7	2.3	virginica
122	1.400000	5.6	2.8	4.9	2.0	virginica
123	1.400000	7.7	2.8	6.7	2.0	virginica

```
124  1.500000          6.3         2.7          4.9         1.8  virginica
125  1.571429          6.7         3.3          5.7         2.1  virginica
126  1.777778          7.2         3.2          6.0         1.8  virginica
127  1.555556          6.2         2.8          4.8         1.8  virginica
128  1.666667          6.1         3.0          4.9         1.8  virginica
129  1.333333          6.4         2.8          5.6         2.1  virginica
130  1.875000          7.2         3.0          5.8         1.6  virginica
131  1.473684          7.4         2.8          6.1         1.9  virginica
132  1.900000          7.9         3.8          6.4         2.0  virginica
133  1.272727          6.4         2.8          5.6         2.2  virginica
134  1.866667          6.3         2.8          5.1         1.5  virginica
135  1.857143          6.1         2.6          5.6         1.4  virginica
136  1.304348          7.7         3.0          6.1         2.3  virginica
137  1.416667          6.3         3.4          5.6         2.4  virginica
138  1.722222          6.4         3.1          5.5         1.8  virginica
139  1.666667          6.0         3.0          4.8         1.8  virginica
140  1.476190          6.9         3.1          5.4         2.1  virginica
141  1.291667          6.7         3.1          5.6         2.4  virginica
142  1.347826          6.9         3.1          5.1         2.3  virginica
143  1.421053          5.8         2.7          5.1         1.9  virginica
144  1.391304          6.8         3.2          5.9         2.3  virginica
145  1.320000          6.7         3.3          5.7         2.5  virginica
146  1.304348          6.7         3.0          5.2         2.3  virginica
147  1.315789          6.3         2.5          5.0         1.9  virginica
148  1.500000          6.5         3.0          5.2         2.0  virginica
149  1.478261          6.2         3.4          5.4         2.3  virginica
150  1.666667          5.9         3.0          5.1         1.8  virginica
```

```r
#e
data |>
  mutate(Ratio = Sepal.Width/Petal.Width) |>
  relocate(Ratio, .after = Petal.Width)
```

```
    Sepal.Length Sepal.Width Petal.Length Petal.Width     Ratio    Species
1            5.1         3.5          1.4         0.2 17.500000     setosa
2            4.9         3.0          1.4         0.2 15.000000     setosa
3            4.7         3.2          1.3         0.2 16.000000     setosa
4            4.6         3.1          1.5         0.2 15.500000     setosa
5            5.0         3.6          1.4         0.2 18.000000     setosa
6            5.4         3.9          1.7         0.4  9.750000     setosa
7            4.6         3.4          1.4         0.3 11.333333     setosa
8            5.0         3.4          1.5         0.2 17.000000     setosa
9            4.4         2.9          1.4         0.2 14.500000     setosa
10           4.9         3.1          1.5         0.1 31.000000     setosa
11           5.4         3.7          1.5         0.2 18.500000     setosa
12           4.8         3.4          1.6         0.2 17.000000     setosa
13           4.8         3.0          1.4         0.1 30.000000     setosa
14           4.3         3.0          1.1         0.1 30.000000     setosa
15           5.8         4.0          1.2         0.2 20.000000     setosa
16           5.7         4.4          1.5         0.4 11.000000     setosa
```

17	5.4	3.9	1.3	0.4	9.750000	setosa
18	5.1	3.5	1.4	0.3	11.666667	setosa
19	5.7	3.8	1.7	0.3	12.666667	setosa
20	5.1	3.8	1.5	0.3	12.666667	setosa
21	5.4	3.4	1.7	0.2	17.000000	setosa
22	5.1	3.7	1.5	0.4	9.250000	setosa
23	4.6	3.6	1.0	0.2	18.000000	setosa
24	5.1	3.3	1.7	0.5	6.600000	setosa
25	4.8	3.4	1.9	0.2	17.000000	setosa
26	5.0	3.0	1.6	0.2	15.000000	setosa
27	5.0	3.4	1.6	0.4	8.500000	setosa
28	5.2	3.5	1.5	0.2	17.500000	setosa
29	5.2	3.4	1.4	0.2	17.000000	setosa
30	4.7	3.2	1.6	0.2	16.000000	setosa
31	4.8	3.1	1.6	0.2	15.500000	setosa
32	5.4	3.4	1.5	0.4	8.500000	setosa
33	5.2	4.1	1.5	0.1	41.000000	setosa
34	5.5	4.2	1.4	0.2	21.000000	setosa
35	4.9	3.1	1.5	0.2	15.500000	setosa
36	5.0	3.2	1.2	0.2	16.000000	setosa
37	5.5	3.5	1.3	0.2	17.500000	setosa
38	4.9	3.6	1.4	0.1	36.000000	setosa
39	4.4	3.0	1.3	0.2	15.000000	setosa
40	5.1	3.4	1.5	0.2	17.000000	setosa
41	5.0	3.5	1.3	0.3	11.666667	setosa
42	4.5	2.3	1.3	0.3	7.666667	setosa
43	4.4	3.2	1.3	0.2	16.000000	setosa
44	5.0	3.5	1.6	0.6	5.833333	setosa
45	5.1	3.8	1.9	0.4	9.500000	setosa
46	4.8	3.0	1.4	0.3	10.000000	setosa
47	5.1	3.8	1.6	0.2	19.000000	setosa
48	4.6	3.2	1.4	0.2	16.000000	setosa
49	5.3	3.7	1.5	0.2	18.500000	setosa
50	5.0	3.3	1.4	0.2	16.500000	setosa
51	7.0	3.2	4.7	1.4	2.285714	versicolor
52	6.4	3.2	4.5	1.5	2.133333	versicolor
53	6.9	3.1	4.9	1.5	2.066667	versicolor
54	5.5	2.3	4.0	1.3	1.769231	versicolor
55	6.5	2.8	4.6	1.5	1.866667	versicolor
56	5.7	2.8	4.5	1.3	2.153846	versicolor
57	6.3	3.3	4.7	1.6	2.062500	versicolor
58	4.9	2.4	3.3	1.0	2.400000	versicolor
59	6.6	2.9	4.6	1.3	2.230769	versicolor
60	5.2	2.7	3.9	1.4	1.928571	versicolor
61	5.0	2.0	3.5	1.0	2.000000	versicolor
62	5.9	3.0	4.2	1.5	2.000000	versicolor
63	6.0	2.2	4.0	1.0	2.200000	versicolor
64	6.1	2.9	4.7	1.4	2.071429	versicolor
65	5.6	2.9	3.6	1.3	2.230769	versicolor
66	6.7	3.1	4.4	1.4	2.214286	versicolor

67	5.6	3.0	4.5	1.5	2.000000	versicolor
68	5.8	2.7	4.1	1.0	2.700000	versicolor
69	6.2	2.2	4.5	1.5	1.466667	versicolor
70	5.6	2.5	3.9	1.1	2.272727	versicolor
71	5.9	3.2	4.8	1.8	1.777778	versicolor
72	6.1	2.8	4.0	1.3	2.153846	versicolor
73	6.3	2.5	4.9	1.5	1.666667	versicolor
74	6.1	2.8	4.7	1.2	2.333333	versicolor
75	6.4	2.9	4.3	1.3	2.230769	versicolor
76	6.6	3.0	4.4	1.4	2.142857	versicolor
77	6.8	2.8	4.8	1.4	2.000000	versicolor
78	6.7	3.0	5.0	1.7	1.764706	versicolor
79	6.0	2.9	4.5	1.5	1.933333	versicolor
80	5.7	2.6	3.5	1.0	2.600000	versicolor
81	5.5	2.4	3.8	1.1	2.181818	versicolor
82	5.5	2.4	3.7	1.0	2.400000	versicolor
83	5.8	2.7	3.9	1.2	2.250000	versicolor
84	6.0	2.7	5.1	1.6	1.687500	versicolor
85	5.4	3.0	4.5	1.5	2.000000	versicolor
86	6.0	3.4	4.5	1.6	2.125000	versicolor
87	6.7	3.1	4.7	1.5	2.066667	versicolor
88	6.3	2.3	4.4	1.3	1.769231	versicolor
89	5.6	3.0	4.1	1.3	2.307692	versicolor
90	5.5	2.5	4.0	1.3	1.923077	versicolor
91	5.5	2.6	4.4	1.2	2.166667	versicolor
92	6.1	3.0	4.6	1.4	2.142857	versicolor
93	5.8	2.6	4.0	1.2	2.166667	versicolor
94	5.0	2.3	3.3	1.0	2.300000	versicolor
95	5.6	2.7	4.2	1.3	2.076923	versicolor
96	5.7	3.0	4.2	1.2	2.500000	versicolor
97	5.7	2.9	4.2	1.3	2.230769	versicolor
98	6.2	2.9	4.3	1.3	2.230769	versicolor
99	5.1	2.5	3.0	1.1	2.272727	versicolor
100	5.7	2.8	4.1	1.3	2.153846	versicolor
101	6.3	3.3	6.0	2.5	1.320000	virginica
102	5.8	2.7	5.1	1.9	1.421053	virginica
103	7.1	3.0	5.9	2.1	1.428571	virginica
104	6.3	2.9	5.6	1.8	1.611111	virginica
105	6.5	3.0	5.8	2.2	1.363636	virginica
106	7.6	3.0	6.6	2.1	1.428571	virginica
107	4.9	2.5	4.5	1.7	1.470588	virginica
108	7.3	2.9	6.3	1.8	1.611111	virginica
109	6.7	2.5	5.8	1.8	1.388889	virginica
110	7.2	3.6	6.1	2.5	1.440000	virginica
111	6.5	3.2	5.1	2.0	1.600000	virginica
112	6.4	2.7	5.3	1.9	1.421053	virginica
113	6.8	3.0	5.5	2.1	1.428571	virginica
114	5.7	2.5	5.0	2.0	1.250000	virginica
115	5.8	2.8	5.1	2.4	1.166667	virginica
116	6.4	3.2	5.3	2.3	1.391304	virginica

```
117          6.5         3.0          5.5         1.8  1.666667  virginica
118          7.7         3.8          6.7         2.2  1.727273  virginica
119          7.7         2.6          6.9         2.3  1.130435  virginica
120          6.0         2.2          5.0         1.5  1.466667  virginica
121          6.9         3.2          5.7         2.3  1.391304  virginica
122          5.6         2.8          4.9         2.0  1.400000  virginica
123          7.7         2.8          6.7         2.0  1.400000  virginica
124          6.3         2.7          4.9         1.8  1.500000  virginica
125          6.7         3.3          5.7         2.1  1.571429  virginica
126          7.2         3.2          6.0         1.8  1.777778  virginica
127          6.2         2.8          4.8         1.8  1.555556  virginica
128          6.1         3.0          4.9         1.8  1.666667  virginica
129          6.4         2.8          5.6         2.1  1.333333  virginica
130          7.2         3.0          5.8         1.6  1.875000  virginica
131          7.4         2.8          6.1         1.9  1.473684  virginica
132          7.9         3.8          6.4         2.0  1.900000  virginica
133          6.4         2.8          5.6         2.2  1.272727  virginica
134          6.3         2.8          5.1         1.5  1.866667  virginica
135          6.1         2.6          5.6         1.4  1.857143  virginica
136          7.7         3.0          6.1         2.3  1.304348  virginica
137          6.3         3.4          5.6         2.4  1.416667  virginica
138          6.4         3.1          5.5         1.8  1.722222  virginica
139          6.0         3.0          4.8         1.8  1.666667  virginica
140          6.9         3.1          5.4         2.1  1.476190  virginica
141          6.7         3.1          5.6         2.4  1.291667  virginica
142          6.9         3.1          5.1         2.3  1.347826  virginica
143          5.8         2.7          5.1         1.9  1.421053  virginica
144          6.8         3.2          5.9         2.3  1.391304  virginica
145          6.7         3.3          5.7         2.5  1.320000  virginica
146          6.7         3.0          5.2         2.3  1.304348  virginica
147          6.3         2.5          5.0         1.9  1.315789  virginica
148          6.5         3.0          5.2         2.0  1.500000  virginica
149          6.2         3.4          5.4         2.3  1.478261  virginica
150          5.9         3.0          5.1         1.8  1.666667  virginica
```

```r
#f
data |>
  group_by(Species) |>
  summarize(mean_p_len = mean(Petal.Length))
```

```
# A tibble: 3 × 2
  Species    mean_p_len
  <fct>           <dbl>
1 setosa           1.46
2 versicolor       4.26
3 virginica        5.55
```

```r
#g
data |>
  mutate(Greater.half = data$Sepal.Width > (data$Sepal.Length/2))
```

	Sepal.Length	Sepal.Width	Petal.Length	Petal.Width	Species	Greater.half
1	5.1	3.5	1.4	0.2	setosa	TRUE
2	4.9	3.0	1.4	0.2	setosa	TRUE
3	4.7	3.2	1.3	0.2	setosa	TRUE
4	4.6	3.1	1.5	0.2	setosa	TRUE
5	5.0	3.6	1.4	0.2	setosa	TRUE
6	5.4	3.9	1.7	0.4	setosa	TRUE
7	4.6	3.4	1.4	0.3	setosa	TRUE
8	5.0	3.4	1.5	0.2	setosa	TRUE
9	4.4	2.9	1.4	0.2	setosa	TRUE
10	4.9	3.1	1.5	0.1	setosa	TRUE
11	5.4	3.7	1.5	0.2	setosa	TRUE
12	4.8	3.4	1.6	0.2	setosa	TRUE
13	4.8	3.0	1.4	0.1	setosa	TRUE
14	4.3	3.0	1.1	0.1	setosa	TRUE
15	5.8	4.0	1.2	0.2	setosa	TRUE
16	5.7	4.4	1.5	0.4	setosa	TRUE
17	5.4	3.9	1.3	0.4	setosa	TRUE
18	5.1	3.5	1.4	0.3	setosa	TRUE
19	5.7	3.8	1.7	0.3	setosa	TRUE
20	5.1	3.8	1.5	0.3	setosa	TRUE
21	5.4	3.4	1.7	0.2	setosa	TRUE
22	5.1	3.7	1.5	0.4	setosa	TRUE
23	4.6	3.6	1.0	0.2	setosa	TRUE
24	5.1	3.3	1.7	0.5	setosa	TRUE
25	4.8	3.4	1.9	0.2	setosa	TRUE
26	5.0	3.0	1.6	0.2	setosa	TRUE
27	5.0	3.4	1.6	0.4	setosa	TRUE
28	5.2	3.5	1.5	0.2	setosa	TRUE
29	5.2	3.4	1.4	0.2	setosa	TRUE
30	4.7	3.2	1.6	0.2	setosa	TRUE
31	4.8	3.1	1.6	0.2	setosa	TRUE
32	5.4	3.4	1.5	0.4	setosa	TRUE
33	5.2	4.1	1.5	0.1	setosa	TRUE
34	5.5	4.2	1.4	0.2	setosa	TRUE
35	4.9	3.1	1.5	0.2	setosa	TRUE
36	5.0	3.2	1.2	0.2	setosa	TRUE
37	5.5	3.5	1.3	0.2	setosa	TRUE
38	4.9	3.6	1.4	0.1	setosa	TRUE
39	4.4	3.0	1.3	0.2	setosa	TRUE
40	5.1	3.4	1.5	0.2	setosa	TRUE
41	5.0	3.5	1.3	0.3	setosa	TRUE
42	4.5	2.3	1.3	0.3	setosa	TRUE
43	4.4	3.2	1.3	0.2	setosa	TRUE
44	5.0	3.5	1.6	0.6	setosa	TRUE
45	5.1	3.8	1.9	0.4	setosa	TRUE
46	4.8	3.0	1.4	0.3	setosa	TRUE
47	5.1	3.8	1.6	0.2	setosa	TRUE
48	4.6	3.2	1.4	0.2	setosa	TRUE
49	5.3	3.7	1.5	0.2	setosa	TRUE

50	5.0	3.3	1.4	0.2	setosa	TRUE
51	7.0	3.2	4.7	1.4	versicolor	FALSE
52	6.4	3.2	4.5	1.5	versicolor	FALSE
53	6.9	3.1	4.9	1.5	versicolor	FALSE
54	5.5	2.3	4.0	1.3	versicolor	FALSE
55	6.5	2.8	4.6	1.5	versicolor	FALSE
56	5.7	2.8	4.5	1.3	versicolor	FALSE
57	6.3	3.3	4.7	1.6	versicolor	TRUE
58	4.9	2.4	3.3	1.0	versicolor	FALSE
59	6.6	2.9	4.6	1.3	versicolor	FALSE
60	5.2	2.7	3.9	1.4	versicolor	TRUE
61	5.0	2.0	3.5	1.0	versicolor	FALSE
62	5.9	3.0	4.2	1.5	versicolor	TRUE
63	6.0	2.2	4.0	1.0	versicolor	FALSE
64	6.1	2.9	4.7	1.4	versicolor	FALSE
65	5.6	2.9	3.6	1.3	versicolor	TRUE
66	6.7	3.1	4.4	1.4	versicolor	FALSE
67	5.6	3.0	4.5	1.5	versicolor	TRUE
68	5.8	2.7	4.1	1.0	versicolor	FALSE
69	6.2	2.2	4.5	1.5	versicolor	FALSE
70	5.6	2.5	3.9	1.1	versicolor	FALSE
71	5.9	3.2	4.8	1.8	versicolor	TRUE
72	6.1	2.8	4.0	1.3	versicolor	FALSE
73	6.3	2.5	4.9	1.5	versicolor	FALSE
74	6.1	2.8	4.7	1.2	versicolor	FALSE
75	6.4	2.9	4.3	1.3	versicolor	FALSE
76	6.6	3.0	4.4	1.4	versicolor	FALSE
77	6.8	2.8	4.8	1.4	versicolor	FALSE
78	6.7	3.0	5.0	1.7	versicolor	FALSE
79	6.0	2.9	4.5	1.5	versicolor	FALSE
80	5.7	2.6	3.5	1.0	versicolor	FALSE
81	5.5	2.4	3.8	1.1	versicolor	FALSE
82	5.5	2.4	3.7	1.0	versicolor	FALSE
83	5.8	2.7	3.9	1.2	versicolor	FALSE
84	6.0	2.7	5.1	1.6	versicolor	FALSE
85	5.4	3.0	4.5	1.5	versicolor	TRUE
86	6.0	3.4	4.5	1.6	versicolor	TRUE
87	6.7	3.1	4.7	1.5	versicolor	FALSE
88	6.3	2.3	4.4	1.3	versicolor	FALSE
89	5.6	3.0	4.1	1.3	versicolor	TRUE
90	5.5	2.5	4.0	1.3	versicolor	FALSE
91	5.5	2.6	4.4	1.2	versicolor	FALSE
92	6.1	3.0	4.6	1.4	versicolor	FALSE
93	5.8	2.6	4.0	1.2	versicolor	FALSE
94	5.0	2.3	3.3	1.0	versicolor	FALSE
95	5.6	2.7	4.2	1.3	versicolor	FALSE
96	5.7	3.0	4.2	1.2	versicolor	TRUE
97	5.7	2.9	4.2	1.3	versicolor	TRUE
98	6.2	2.9	4.3	1.3	versicolor	FALSE
99	5.1	2.5	3.0	1.1	versicolor	FALSE

100	5.7	2.8	4.1	1.3	versicolor	FALSE
101	6.3	3.3	6.0	2.5	virginica	TRUE
102	5.8	2.7	5.1	1.9	virginica	FALSE
103	7.1	3.0	5.9	2.1	virginica	FALSE
104	6.3	2.9	5.6	1.8	virginica	FALSE
105	6.5	3.0	5.8	2.2	virginica	FALSE
106	7.6	3.0	6.6	2.1	virginica	FALSE
107	4.9	2.5	4.5	1.7	virginica	TRUE
108	7.3	2.9	6.3	1.8	virginica	FALSE
109	6.7	2.5	5.8	1.8	virginica	FALSE
110	7.2	3.6	6.1	2.5	virginica	FALSE
111	6.5	3.2	5.1	2.0	virginica	FALSE
112	6.4	2.7	5.3	1.9	virginica	FALSE
113	6.8	3.0	5.5	2.1	virginica	FALSE
114	5.7	2.5	5.0	2.0	virginica	FALSE
115	5.8	2.8	5.1	2.4	virginica	FALSE
116	6.4	3.2	5.3	2.3	virginica	FALSE
117	6.5	3.0	5.5	1.8	virginica	FALSE
118	7.7	3.8	6.7	2.2	virginica	FALSE
119	7.7	2.6	6.9	2.3	virginica	FALSE
120	6.0	2.2	5.0	1.5	virginica	FALSE
121	6.9	3.2	5.7	2.3	virginica	FALSE
122	5.6	2.8	4.9	2.0	virginica	FALSE
123	7.7	2.8	6.7	2.0	virginica	FALSE
124	6.3	2.7	4.9	1.8	virginica	FALSE
125	6.7	3.3	5.7	2.1	virginica	FALSE
126	7.2	3.2	6.0	1.8	virginica	FALSE
127	6.2	2.8	4.8	1.8	virginica	FALSE
128	6.1	3.0	4.9	1.8	virginica	FALSE
129	6.4	2.8	5.6	2.1	virginica	FALSE
130	7.2	3.0	5.8	1.6	virginica	FALSE
131	7.4	2.8	6.1	1.9	virginica	FALSE
132	7.9	3.8	6.4	2.0	virginica	FALSE
133	6.4	2.8	5.6	2.2	virginica	FALSE
134	6.3	2.8	5.1	1.5	virginica	FALSE
135	6.1	2.6	5.6	1.4	virginica	FALSE
136	7.7	3.0	6.1	2.3	virginica	FALSE
137	6.3	3.4	5.6	2.4	virginica	TRUE
138	6.4	3.1	5.5	1.8	virginica	FALSE
139	6.0	3.0	4.8	1.8	virginica	FALSE
140	6.9	3.1	5.4	2.1	virginica	FALSE
141	6.7	3.1	5.6	2.4	virginica	FALSE
142	6.9	3.1	5.1	2.3	virginica	FALSE
143	5.8	2.7	5.1	1.9	virginica	FALSE
144	6.8	3.2	5.9	2.3	virginica	FALSE
145	6.7	3.3	5.7	2.5	virginica	FALSE
146	6.7	3.0	5.2	2.3	virginica	FALSE
147	6.3	2.5	5.0	1.9	virginica	FALSE
148	6.5	3.0	5.2	2.0	virginica	FALSE

```
149          6.2         3.4          5.4         2.3  virginica         TRUE
150          5.9         3.0          5.1         1.8  virginica         TRUE
```

```
#h
data |>
  filter(Species == "setosa")
```

```
   Sepal.Length Sepal.Width Petal.Length Petal.Width Species
1           5.1         3.5          1.4         0.2  setosa
2           4.9         3.0          1.4         0.2  setosa
3           4.7         3.2          1.3         0.2  setosa
4           4.6         3.1          1.5         0.2  setosa
5           5.0         3.6          1.4         0.2  setosa
6           5.4         3.9          1.7         0.4  setosa
7           4.6         3.4          1.4         0.3  setosa
8           5.0         3.4          1.5         0.2  setosa
9           4.4         2.9          1.4         0.2  setosa
10          4.9         3.1          1.5         0.1  setosa
11          5.4         3.7          1.5         0.2  setosa
12          4.8         3.4          1.6         0.2  setosa
13          4.8         3.0          1.4         0.1  setosa
14          4.3         3.0          1.1         0.1  setosa
15          5.8         4.0          1.2         0.2  setosa
16          5.7         4.4          1.5         0.4  setosa
17          5.4         3.9          1.3         0.4  setosa
18          5.1         3.5          1.4         0.3  setosa
19          5.7         3.8          1.7         0.3  setosa
20          5.1         3.8          1.5         0.3  setosa
21          5.4         3.4          1.7         0.2  setosa
22          5.1         3.7          1.5         0.4  setosa
23          4.6         3.6          1.0         0.2  setosa
24          5.1         3.3          1.7         0.5  setosa
25          4.8         3.4          1.9         0.2  setosa
26          5.0         3.0          1.6         0.2  setosa
27          5.0         3.4          1.6         0.4  setosa
28          5.2         3.5          1.5         0.2  setosa
29          5.2         3.4          1.4         0.2  setosa
30          4.7         3.2          1.6         0.2  setosa
31          4.8         3.1          1.6         0.2  setosa
32          5.4         3.4          1.5         0.4  setosa
33          5.2         4.1          1.5         0.1  setosa
34          5.5         4.2          1.4         0.2  setosa
35          4.9         3.1          1.5         0.2  setosa
36          5.0         3.2          1.2         0.2  setosa
37          5.5         3.5          1.3         0.2  setosa
38          4.9         3.6          1.4         0.1  setosa
39          4.4         3.0          1.3         0.2  setosa
40          5.1         3.4          1.5         0.2  setosa
41          5.0         3.5          1.3         0.3  setosa
42          4.5         2.3          1.3         0.3  setosa
```

```
43          4.4         3.2          1.3         0.2  setosa
44          5.0         3.5          1.6         0.6  setosa
45          5.1         3.8          1.9         0.4  setosa
46          4.8         3.0          1.4         0.3  setosa
47          5.1         3.8          1.6         0.2  setosa
48          4.6         3.2          1.4         0.2  setosa
49          5.3         3.7          1.5         0.2  setosa
50          5.0         3.3          1.4         0.2  setosa
```

```
#i
data |>
  rename(iris.species = Species)
```

```
    Sepal.Length Sepal.Width Petal.Length Petal.Width iris.species
1            5.1         3.5          1.4         0.2       setosa
2            4.9         3.0          1.4         0.2       setosa
3            4.7         3.2          1.3         0.2       setosa
4            4.6         3.1          1.5         0.2       setosa
5            5.0         3.6          1.4         0.2       setosa
6            5.4         3.9          1.7         0.4       setosa
7            4.6         3.4          1.4         0.3       setosa
8            5.0         3.4          1.5         0.2       setosa
9            4.4         2.9          1.4         0.2       setosa
10           4.9         3.1          1.5         0.1       setosa
11           5.4         3.7          1.5         0.2       setosa
12           4.8         3.4          1.6         0.2       setosa
13           4.8         3.0          1.4         0.1       setosa
14           4.3         3.0          1.1         0.1       setosa
15           5.8         4.0          1.2         0.2       setosa
16           5.7         4.4          1.5         0.4       setosa
17           5.4         3.9          1.3         0.4       setosa
18           5.1         3.5          1.4         0.3       setosa
19           5.7         3.8          1.7         0.3       setosa
20           5.1         3.8          1.5         0.3       setosa
21           5.4         3.4          1.7         0.2       setosa
22           5.1         3.7          1.5         0.4       setosa
23           4.6         3.6          1.0         0.2       setosa
24           5.1         3.3          1.7         0.5       setosa
25           4.8         3.4          1.9         0.2       setosa
26           5.0         3.0          1.6         0.2       setosa
27           5.0         3.4          1.6         0.4       setosa
28           5.2         3.5          1.5         0.2       setosa
29           5.2         3.4          1.4         0.2       setosa
30           4.7         3.2          1.6         0.2       setosa
31           4.8         3.1          1.6         0.2       setosa
32           5.4         3.4          1.5         0.4       setosa
33           5.2         4.1          1.5         0.1       setosa
34           5.5         4.2          1.4         0.2       setosa
35           4.9         3.1          1.5         0.2       setosa
36           5.0         3.2          1.2         0.2       setosa
```

37	5.5	3.5	1.3	0.2	setosa
38	4.9	3.6	1.4	0.1	setosa
39	4.4	3.0	1.3	0.2	setosa
40	5.1	3.4	1.5	0.2	setosa
41	5.0	3.5	1.3	0.3	setosa
42	4.5	2.3	1.3	0.3	setosa
43	4.4	3.2	1.3	0.2	setosa
44	5.0	3.5	1.6	0.6	setosa
45	5.1	3.8	1.9	0.4	setosa
46	4.8	3.0	1.4	0.3	setosa
47	5.1	3.8	1.6	0.2	setosa
48	4.6	3.2	1.4	0.2	setosa
49	5.3	3.7	1.5	0.2	setosa
50	5.0	3.3	1.4	0.2	setosa
51	7.0	3.2	4.7	1.4	versicolor
52	6.4	3.2	4.5	1.5	versicolor
53	6.9	3.1	4.9	1.5	versicolor
54	5.5	2.3	4.0	1.3	versicolor
55	6.5	2.8	4.6	1.5	versicolor
56	5.7	2.8	4.5	1.3	versicolor
57	6.3	3.3	4.7	1.6	versicolor
58	4.9	2.4	3.3	1.0	versicolor
59	6.6	2.9	4.6	1.3	versicolor
60	5.2	2.7	3.9	1.4	versicolor
61	5.0	2.0	3.5	1.0	versicolor
62	5.9	3.0	4.2	1.5	versicolor
63	6.0	2.2	4.0	1.0	versicolor
64	6.1	2.9	4.7	1.4	versicolor
65	5.6	2.9	3.6	1.3	versicolor
66	6.7	3.1	4.4	1.4	versicolor
67	5.6	3.0	4.5	1.5	versicolor
68	5.8	2.7	4.1	1.0	versicolor
69	6.2	2.2	4.5	1.5	versicolor
70	5.6	2.5	3.9	1.1	versicolor
71	5.9	3.2	4.8	1.8	versicolor
72	6.1	2.8	4.0	1.3	versicolor
73	6.3	2.5	4.9	1.5	versicolor
74	6.1	2.8	4.7	1.2	versicolor
75	6.4	2.9	4.3	1.3	versicolor
76	6.6	3.0	4.4	1.4	versicolor
77	6.8	2.8	4.8	1.4	versicolor
78	6.7	3.0	5.0	1.7	versicolor
79	6.0	2.9	4.5	1.5	versicolor
80	5.7	2.6	3.5	1.0	versicolor
81	5.5	2.4	3.8	1.1	versicolor
82	5.5	2.4	3.7	1.0	versicolor
83	5.8	2.7	3.9	1.2	versicolor
84	6.0	2.7	5.1	1.6	versicolor
85	5.4	3.0	4.5	1.5	versicolor
86	6.0	3.4	4.5	1.6	versicolor

87	6.7	3.1	4.7	1.5	versicolor
88	6.3	2.3	4.4	1.3	versicolor
89	5.6	3.0	4.1	1.3	versicolor
90	5.5	2.5	4.0	1.3	versicolor
91	5.5	2.6	4.4	1.2	versicolor
92	6.1	3.0	4.6	1.4	versicolor
93	5.8	2.6	4.0	1.2	versicolor
94	5.0	2.3	3.3	1.0	versicolor
95	5.6	2.7	4.2	1.3	versicolor
96	5.7	3.0	4.2	1.2	versicolor
97	5.7	2.9	4.2	1.3	versicolor
98	6.2	2.9	4.3	1.3	versicolor
99	5.1	2.5	3.0	1.1	versicolor
100	5.7	2.8	4.1	1.3	versicolor
101	6.3	3.3	6.0	2.5	virginica
102	5.8	2.7	5.1	1.9	virginica
103	7.1	3.0	5.9	2.1	virginica
104	6.3	2.9	5.6	1.8	virginica
105	6.5	3.0	5.8	2.2	virginica
106	7.6	3.0	6.6	2.1	virginica
107	4.9	2.5	4.5	1.7	virginica
108	7.3	2.9	6.3	1.8	virginica
109	6.7	2.5	5.8	1.8	virginica
110	7.2	3.6	6.1	2.5	virginica
111	6.5	3.2	5.1	2.0	virginica
112	6.4	2.7	5.3	1.9	virginica
113	6.8	3.0	5.5	2.1	virginica
114	5.7	2.5	5.0	2.0	virginica
115	5.8	2.8	5.1	2.4	virginica
116	6.4	3.2	5.3	2.3	virginica
117	6.5	3.0	5.5	1.8	virginica
118	7.7	3.8	6.7	2.2	virginica
119	7.7	2.6	6.9	2.3	virginica
120	6.0	2.2	5.0	1.5	virginica
121	6.9	3.2	5.7	2.3	virginica
122	5.6	2.8	4.9	2.0	virginica
123	7.7	2.8	6.7	2.0	virginica
124	6.3	2.7	4.9	1.8	virginica
125	6.7	3.3	5.7	2.1	virginica
126	7.2	3.2	6.0	1.8	virginica
127	6.2	2.8	4.8	1.8	virginica
128	6.1	3.0	4.9	1.8	virginica
129	6.4	2.8	5.6	2.1	virginica
130	7.2	3.0	5.8	1.6	virginica
131	7.4	2.8	6.1	1.9	virginica
132	7.9	3.8	6.4	2.0	virginica
133	6.4	2.8	5.6	2.2	virginica
134	6.3	2.8	5.1	1.5	virginica
135	6.1	2.6	5.6	1.4	virginica
136	7.7	3.0	6.1	2.3	virginica

137	6.3	3.4	5.6	2.4	virginica
138	6.4	3.1	5.5	1.8	virginica
139	6.0	3.0	4.8	1.8	virginica
140	6.9	3.1	5.4	2.1	virginica
141	6.7	3.1	5.6	2.4	virginica
142	6.9	3.1	5.1	2.3	virginica
143	5.8	2.7	5.1	1.9	virginica
144	6.8	3.2	5.9	2.3	virginica
145	6.7	3.3	5.7	2.5	virginica
146	6.7	3.0	5.2	2.3	virginica
147	6.3	2.5	5.0	1.9	virginica
148	6.5	3.0	5.2	2.0	virginica
149	6.2	3.4	5.4	2.3	virginica
150	5.9	3.0	5.1	1.8	virginica