```
> iris
   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
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
> #1a. Make a histogram of the variable Sepal.Width.
> hist(iris$Sepal.Width)
> #1b. Based on the histogram from #1a, which would you expect to be higher, the mean or the median?
Why?
> #The data intially looks evenly distribuated, but with a futher look it may be slightly right
skewed. There are more data points to the left of the graph. Therefore, the mean may be slightly
higher than the median.
> #1c. Confirm your answer to #1b by actually finding these values.
> mean(iris$Sepal.Width)
[1] 3.057333
> mediam(iris$Sepal.Width)
Error in mediam(iris$Sepal.Width) : could not find function "mediam"
> median(iris$Sepal.Width)
[1] 3
> #1d. Only 27% of the flowers have a Sepal.Width higher than _____ cm.
>
> ?quantile
> quantile(iris$Sepal.Width, 0.73)
73%
3.3
> #only 27% of flowers hace a Sepal.Width higher than 3.3 cm
> #1e. Make scatterplots of each pair of the numerical variables in iris (There should be 6 pairs/
```

```
plots).
> ?pairs
> pairs(iris[,1:4], col=iris$Species)
> #1f. Based on #1e, which two variables appear to have the strongest relationship? And which two
appear to have the weakest relationship?
> #The strongest relationship seems to be Petal.Length and Petal.Width. There is a strong linear,
positive realtionship between the two variables. The weakest relationship seems to be either
Sepal.Width and Petal.Length or Sepal.Width and Petal.Width. There is no clear trend, the data
points are very spread out.
>
> PlantGrowth
   weight group
1    4.17  ctrl
2    5.58  ctrl
3    5.18  ctrl
4    6.11  ctrl
5    4.50  ctrl
6    4.61  ctrl
7    5.17  ctrl
8    4.53  ctrl
9    5.33  ctrl
10   5.14  ctrl
11   4.81  trt1
12   4.17  trt1
13   4.41  trt1
14   3.59  trt1
15   5.87  trt1
16   3.83  trt1
17   6.03  trt1
18   4.89  trt1
19   4.32  trt1
20   4.69  trt1
21   6.31  trt2
22   5.12  trt2
23   5.54  trt2
24   5.50  trt2
25   5.37  trt2
26   5.29  trt2
27   4.92  trt2
28   6.15  trt2
29   5.80  trt2
30   5.26  trt2
> #2a. Make a histogram of the variable weight with breakpoints (bin edges) at every 0.3 units,
starting at 3.3.
> max(PlantGrowth$weight)
[1] 6.31
> hist(PlantGrowth$weight, breaks = seq(3.3, 6.6, by=0.3))
> #2b. Make boxplots of weight separated by group in a single graph.
> ?boxplot
> boxplot(PlantGrowth$weight ~ PlantGrowth$group)
> #2c. Based on the boxplots in #2b, approximately what percentage of the "trt1" weights are below
the minimum "trt2" weight?
> #Not taking into immediate consideration of the trt1 outlier, 3 quartiles of the trt1 are below
the trt2 minimum. That would be 75%, however, with the outlier in consideration, it would be lower,
I would say close to 70%.
> #2d. Find the exact percentage of the "trt1" weights that are below the minimum "trt2" weight.
> trt1_weight <- PlantGrowth$weight[PlantGrowth$group == "trt1"]
> trt2_weight <- PlantGrowth$weight[PlantGrowth$group == "trt2"]
```

```
> trt2_min <- min(trt2_weight)
> trt2_min
[1] 4.92
> countbelow = sum(trt1_weight < trt2_weight)
> countbelow
[1] 8
> percentbelow = (countbelow / length(trt1_weight)) * 100
> percentbelow
[1] 80
> #AHH i messed up see new calculation below
> countbelow = sum(trt1_weight < trt2_min)
> countbelow
[1] 8
> percentbelow = (countbelow / length(trt1_weight)) * 100
> percentbelow
[1] 80
> #80% of trt1 is below the min of trt2. I confused myself on 2c., more data would be under the min
because of the outlier, not less.
> #2e. Only including plants with a weight above 5.5, make a barplot of the variable group. Make the
barplot colorful using some color palette (in R, try running ?heat.colors and/or check out https://
www.r-bloggers.com/palettes-in-r/).
> ?heat.colors
> ?barplot
> barplot(table(PlantGrowth$group[PlantGrowth$weight > 5.5]), main = "Weight Above 5.5", col =
heat.colors(3), xlab = "Group", ylab = "Count")
>
```
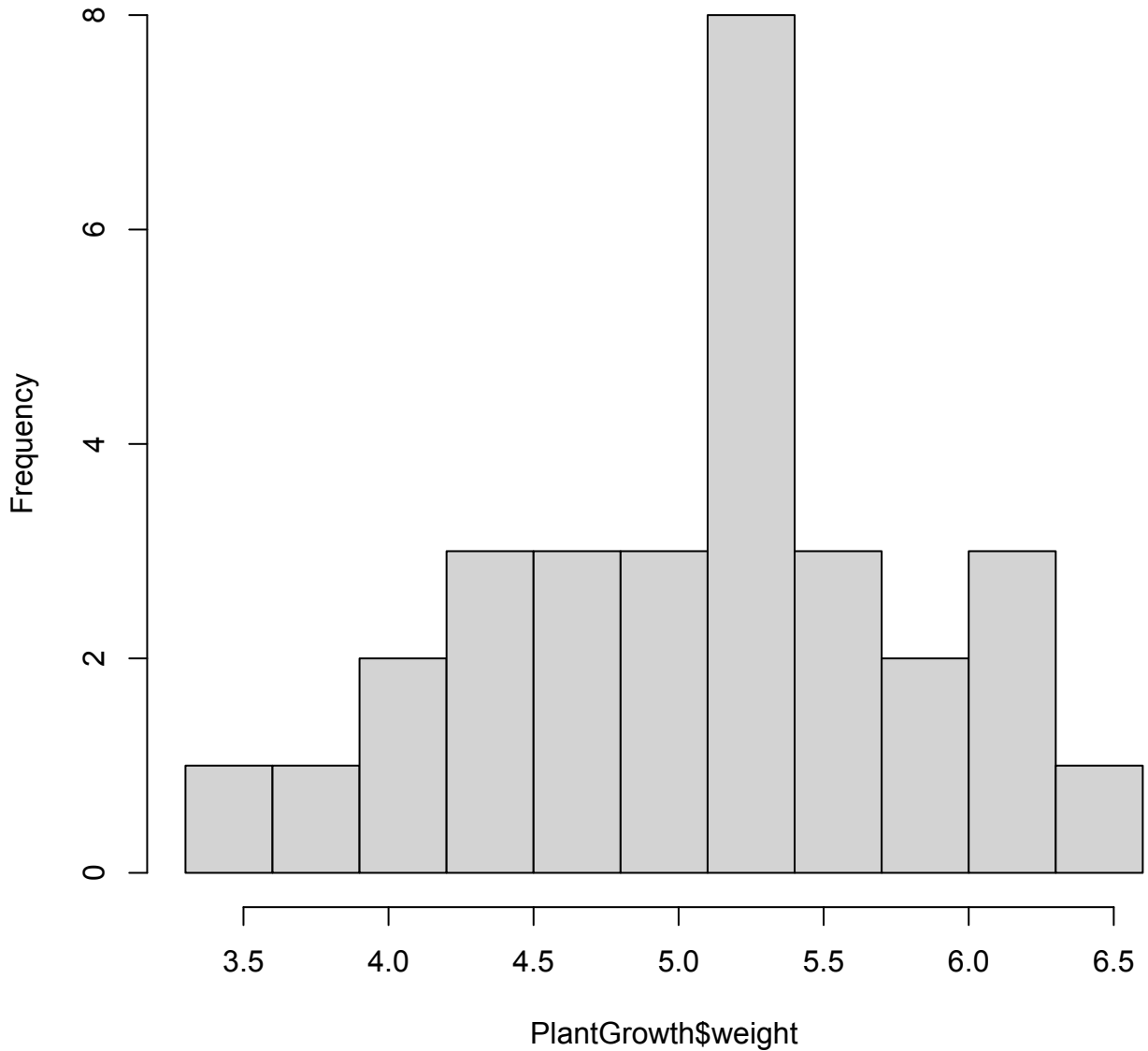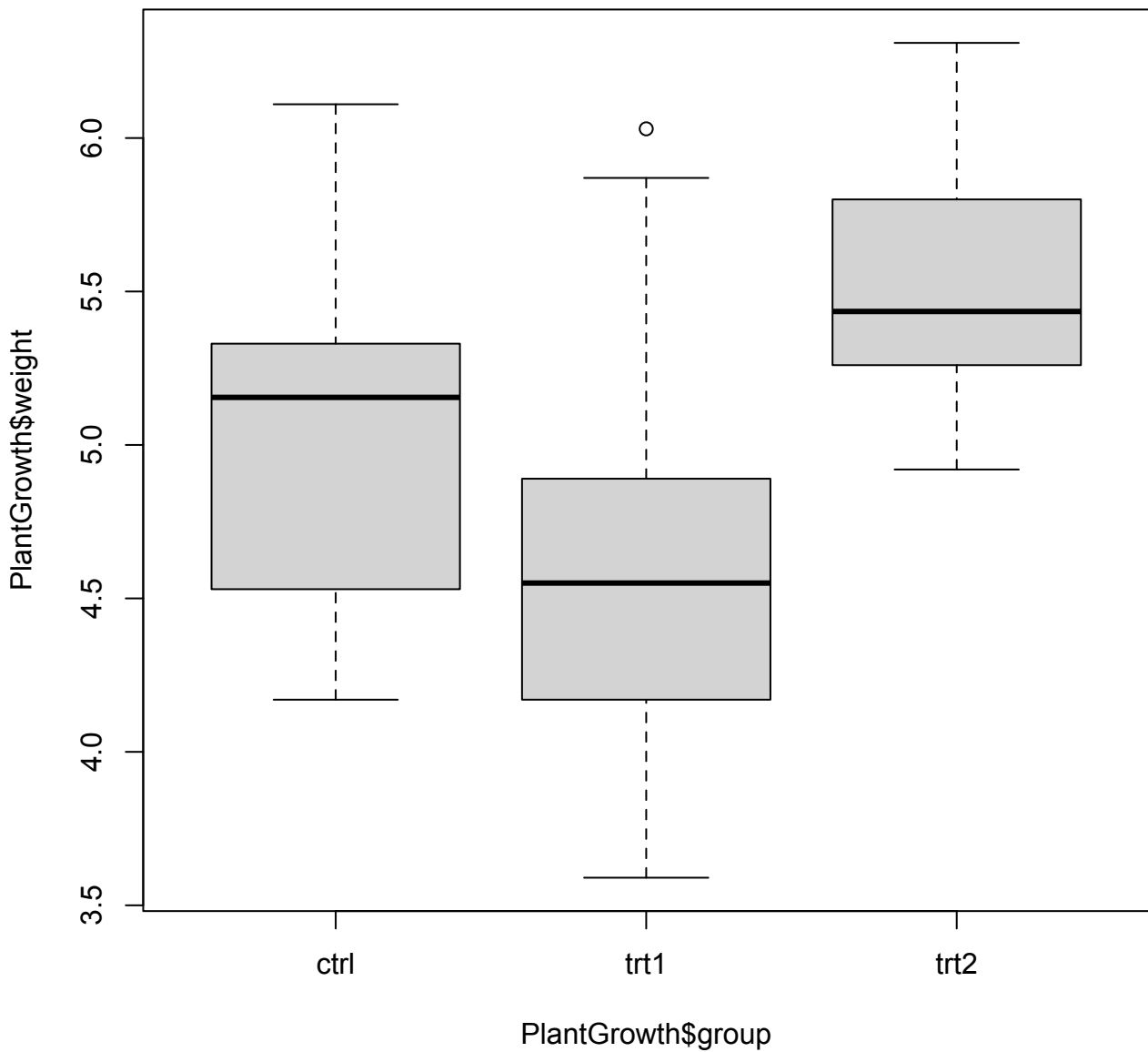
Histogram of iris$Sepal.Width
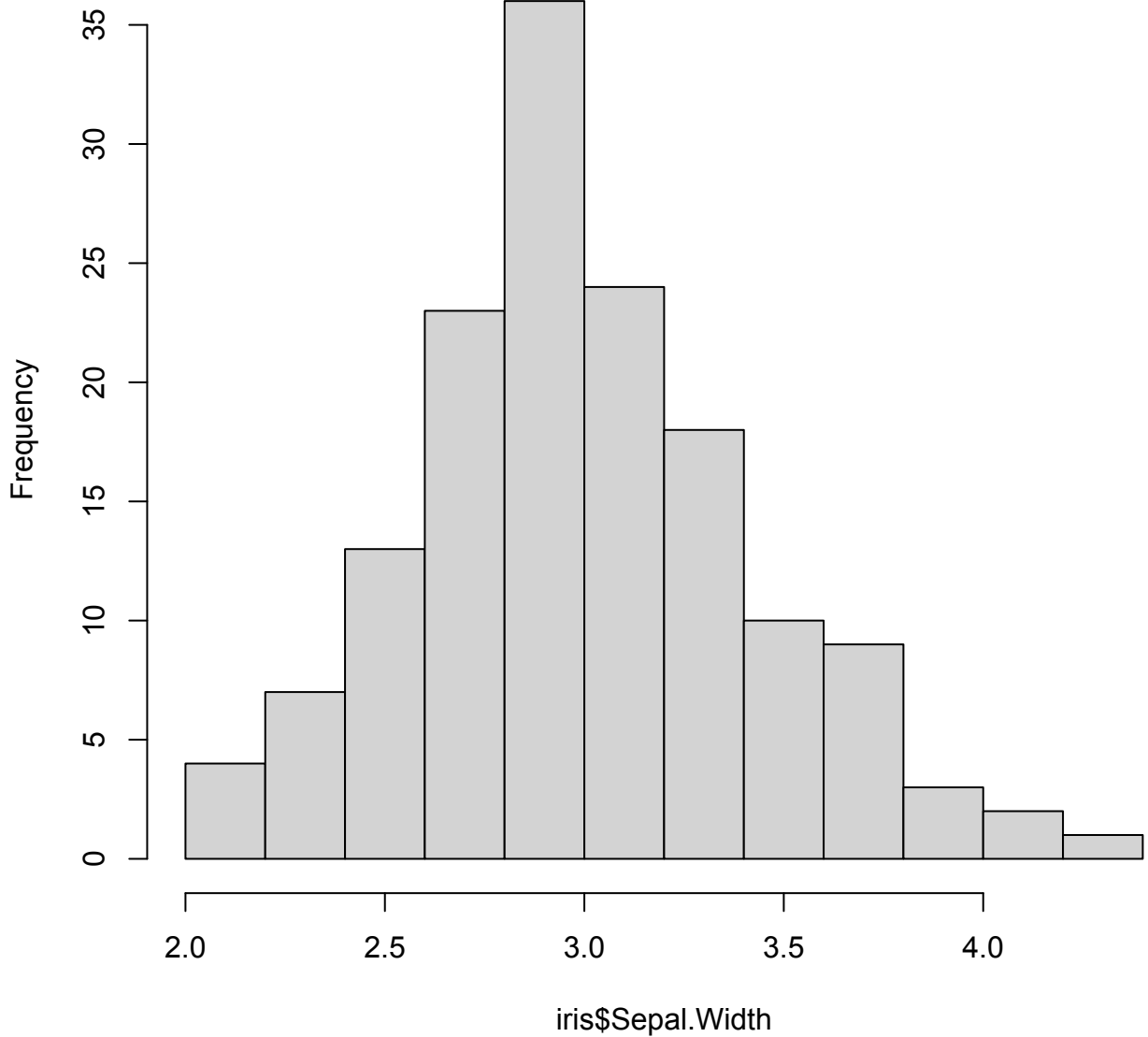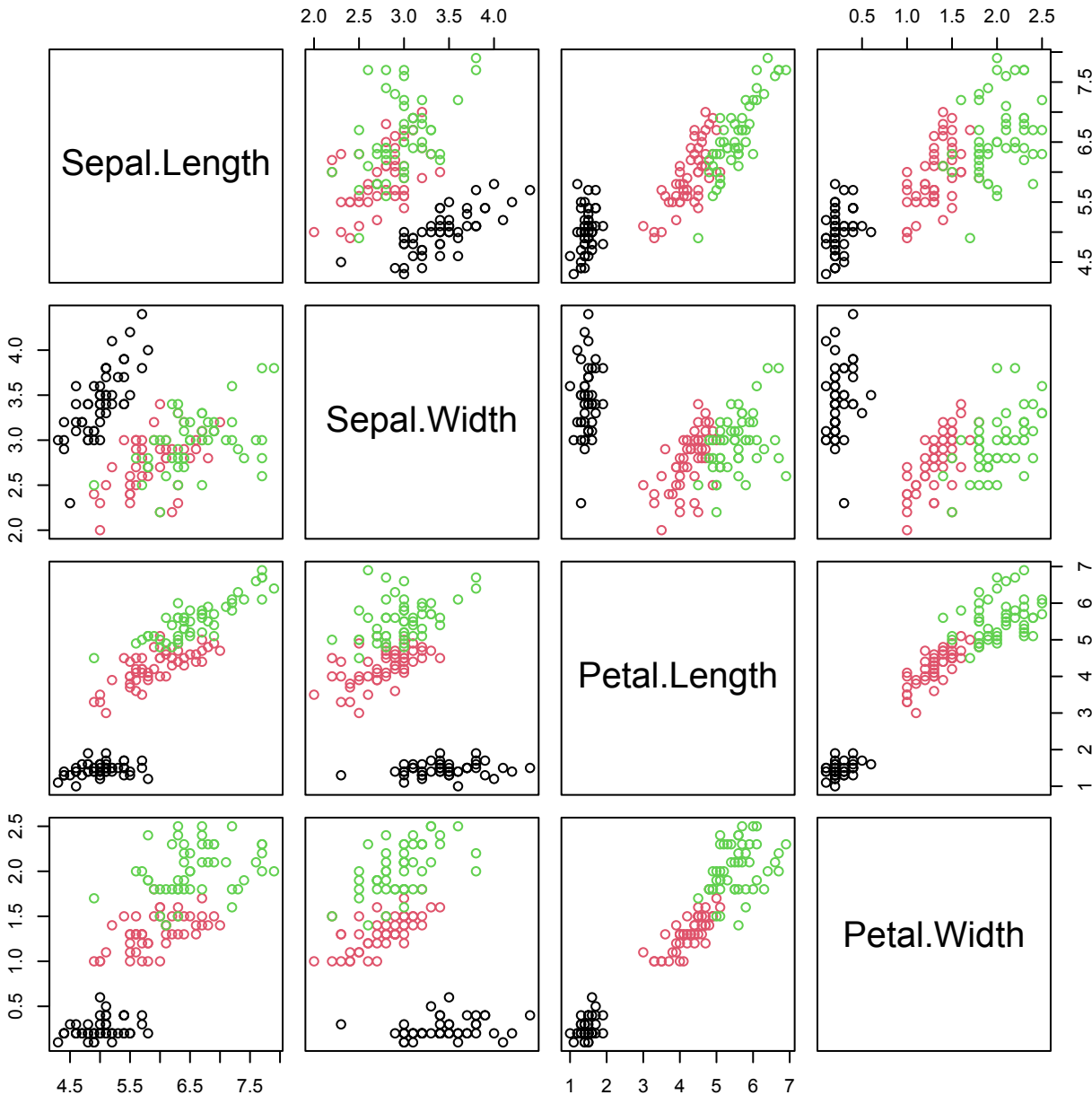
Histogram of PlantGrowth$weight

Weight Above 5.5