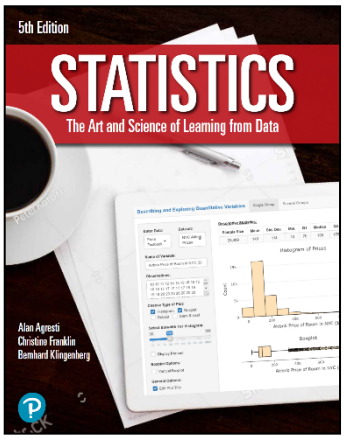


R Code for Examples in the book
"Statistics: The Art and Science of Learning from Data"
by Agresti, Franklin and Klingenberg, 5th edition

Chapter 2

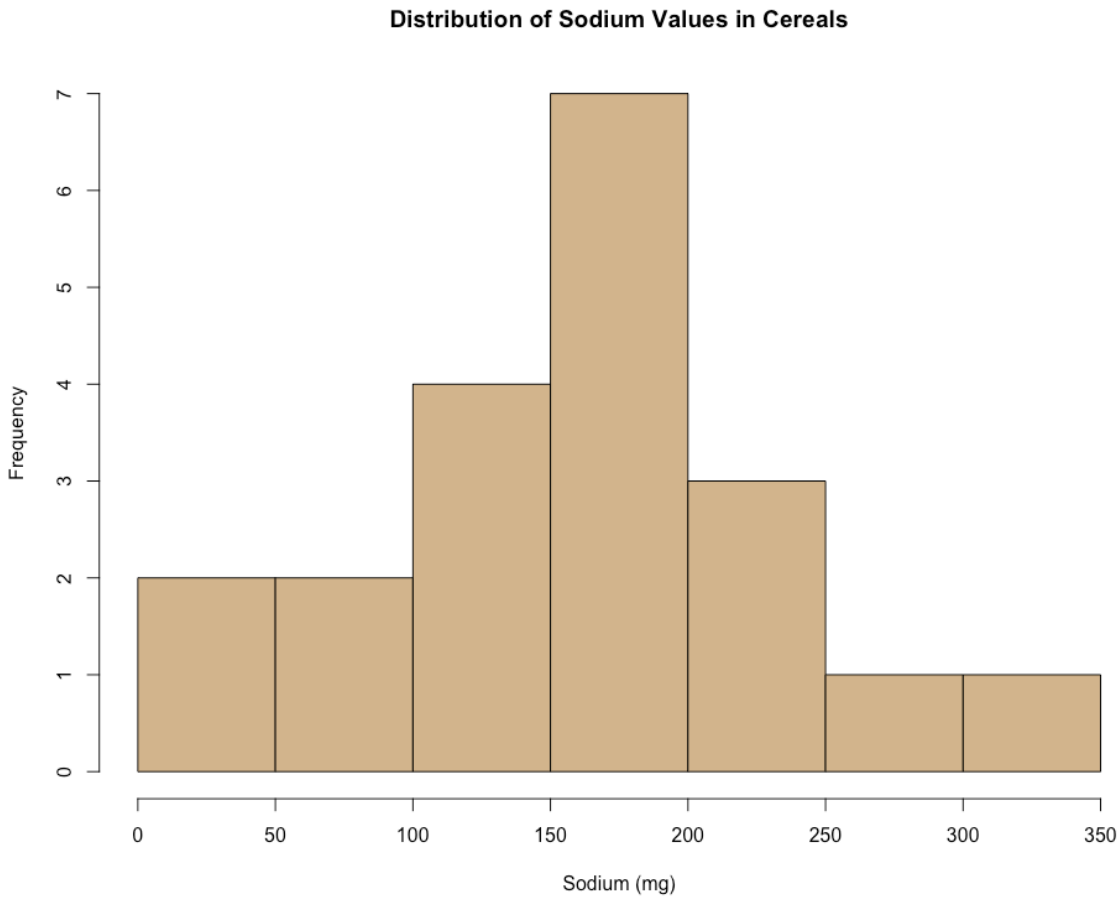
Example 7: Health Value of Cereals – Histogram for a Continuous Variable

Read in Sodium values:

```
sodium <- c(0, 340, 70, 140, 200, 180, 210, 150, 100, 130,
            140, 180, 190, 160, 290, 50, 220, 180, 200, 210)
```

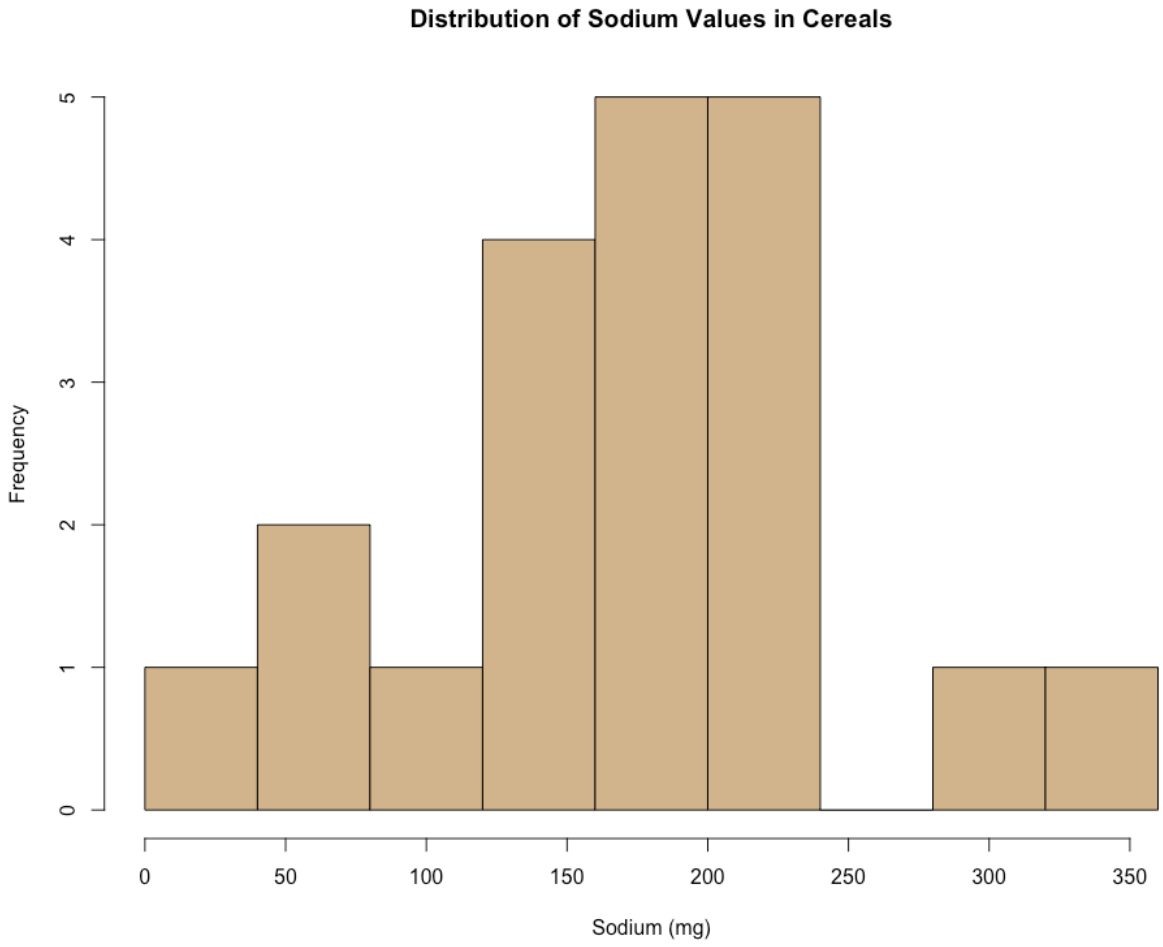
Create Basic Histogram:

```
hist(sodium, col = 'tan',
     main = 'Distribution of Sodium Values in Cereals',
     xlab = 'Sodium (mg)', ylab = 'Frequency')
```



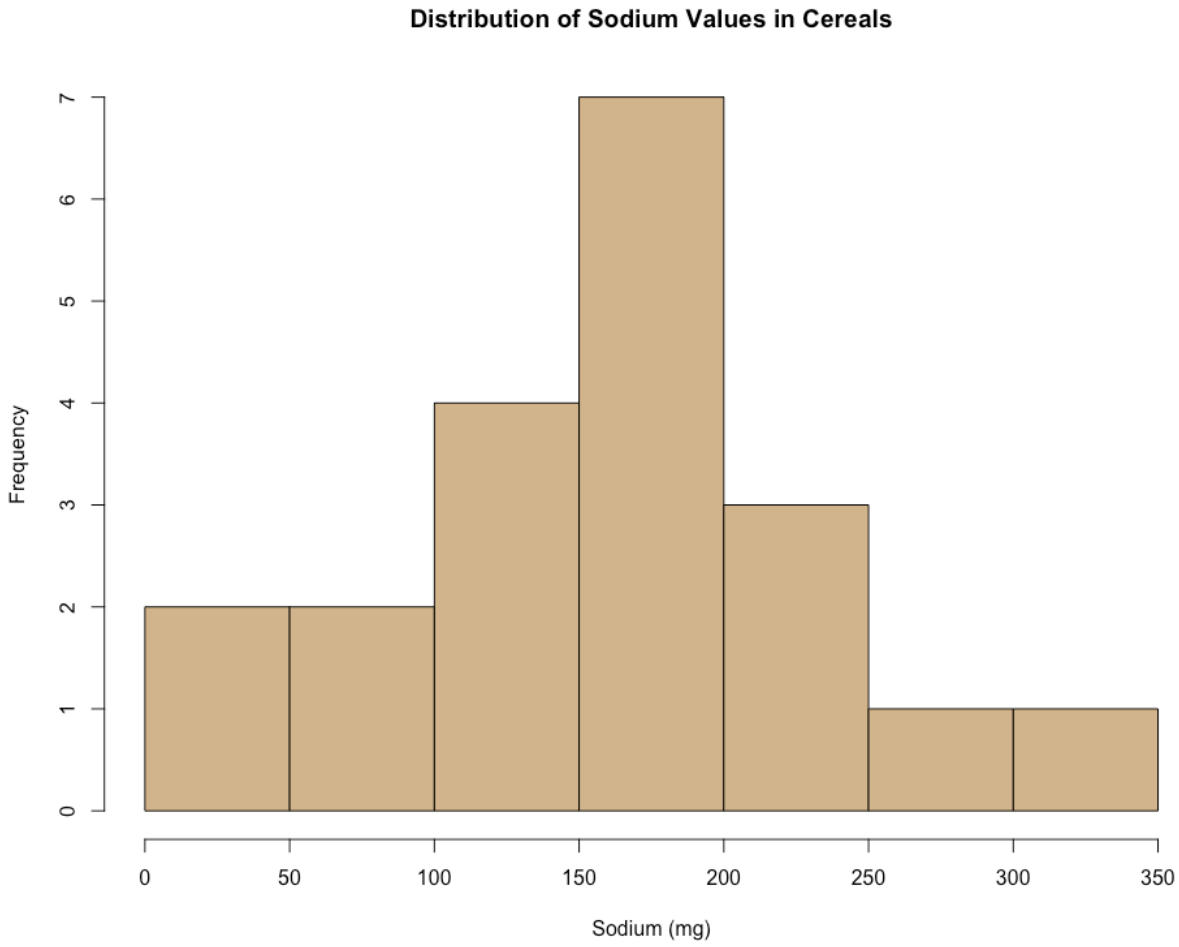
Changing the bins by providing the boundaries. (Note: `right = FALSE` puts an observation such as 120 in the interval from 120-160 and not 80-120).

```
hist(sodium, breaks = seq(0,360,40), right = FALSE, col = 'tan',
     main = 'Distribution of Sodium Values in Cereals',
     xlab = 'Sodium (mg)', ylab = 'Frequency')
```



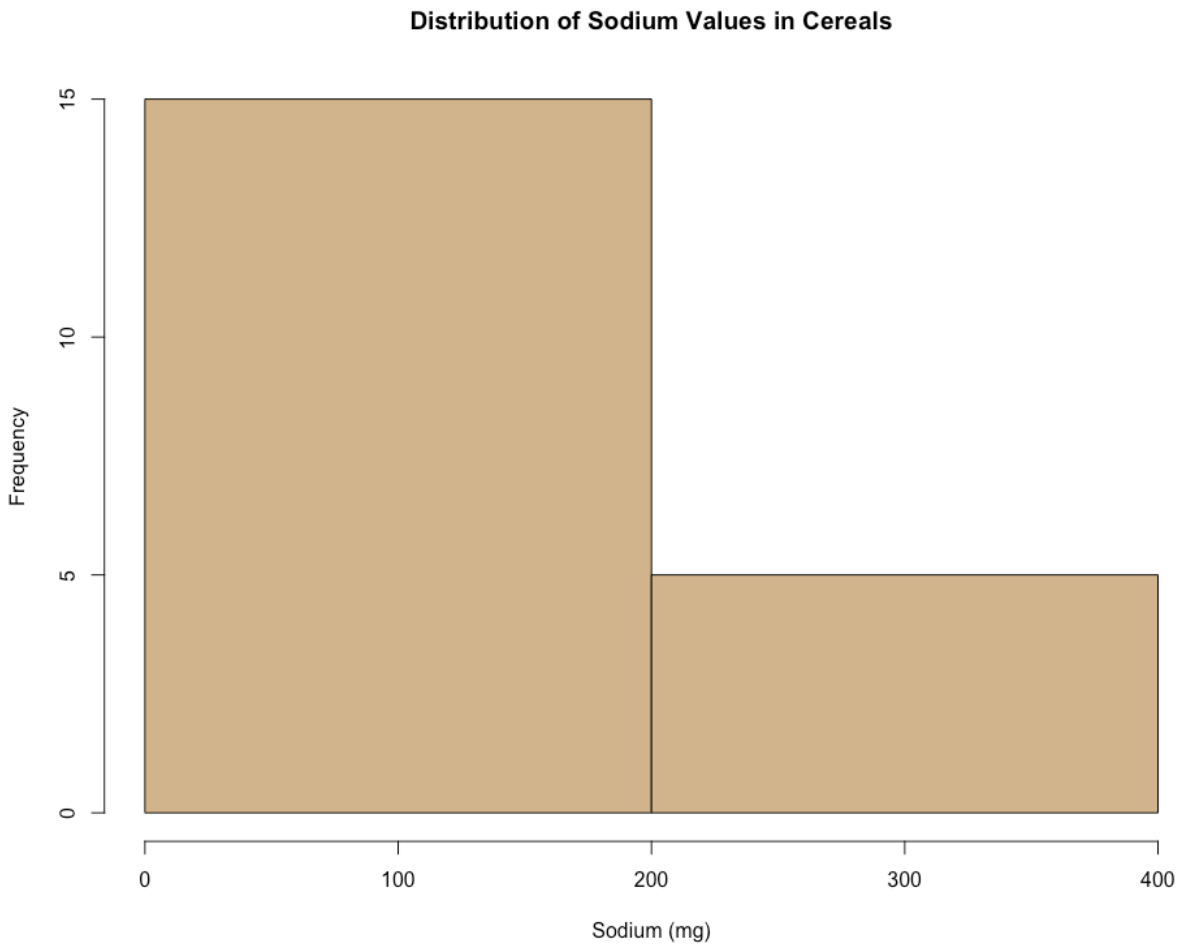
Another way to request a certain number of bins:

```
hist(sodium, breaks = 10,  col = 'tan',
     main = 'Distribution of Sodium Values in Cereals',
     xlab = 'Sodium (mg)', ylab = 'Frequency')
```



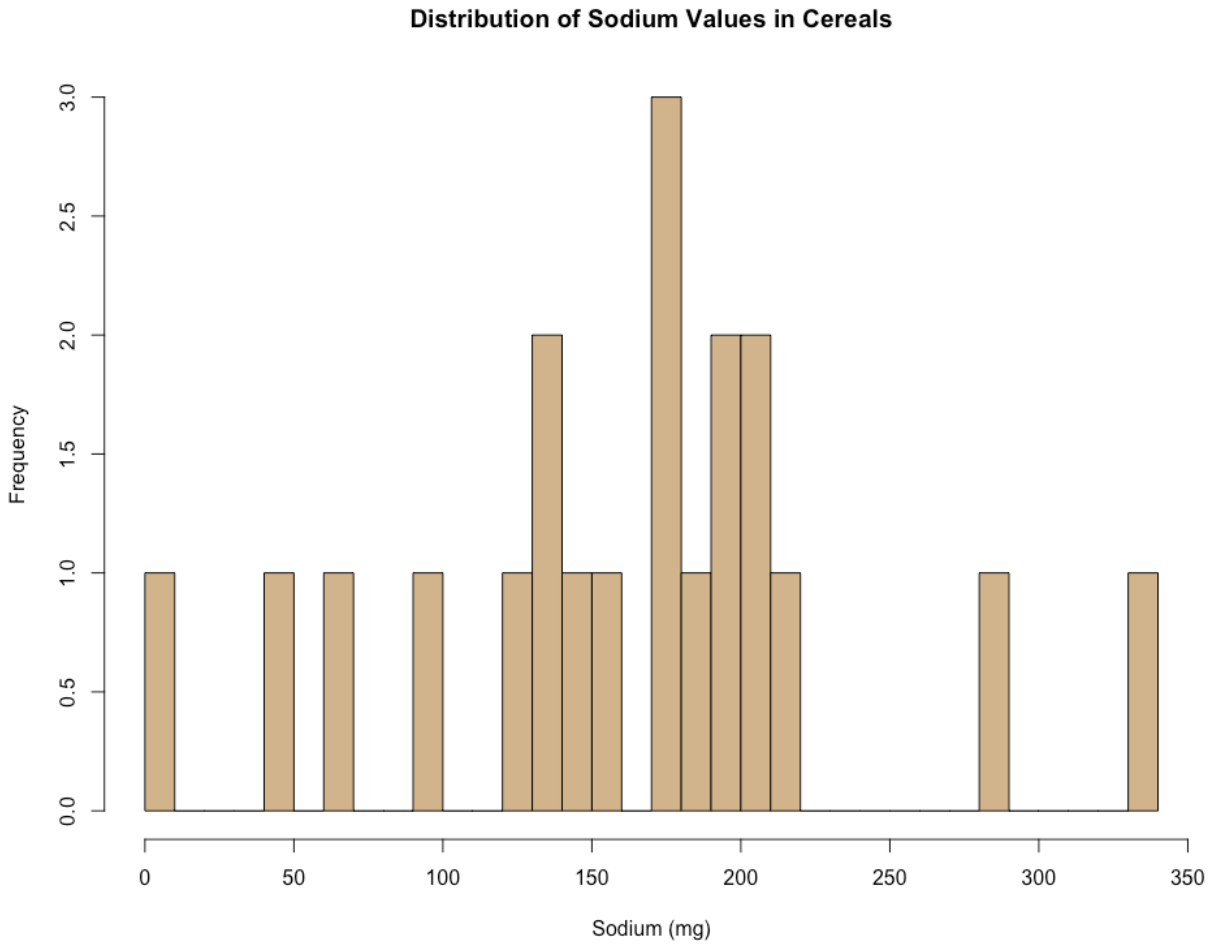
Too few breaks:

```
hist(sodium, breaks = 2, col = 'tan',
     main = 'Distribution of Sodium Values in Cereals',
     xlab = 'Sodium (mg)', ylab = 'Frequency')
```



Too many breaks:

```
hist(sodium, breaks = 30, col = 'tan',
     main = 'Distribution of Sodium Values in Cereals',
     xlab = 'Sodium (mg)', ylab = 'Frequency')
```

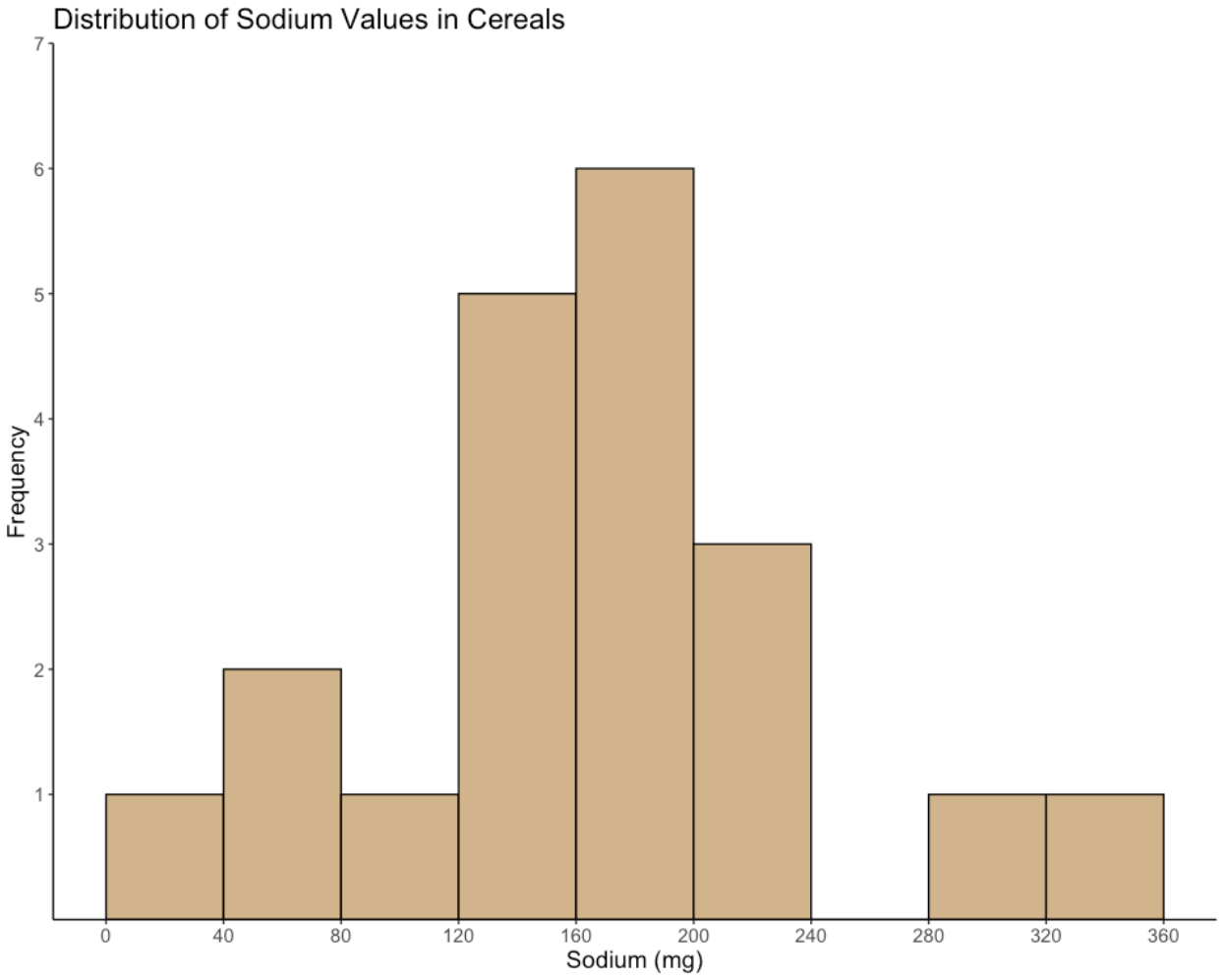


For more fine tuning, it is better to use the ggplot2 library. If you haven't installed it already, first type: `install.packages(ggplot2)`.

```
library(ggplot2)
```

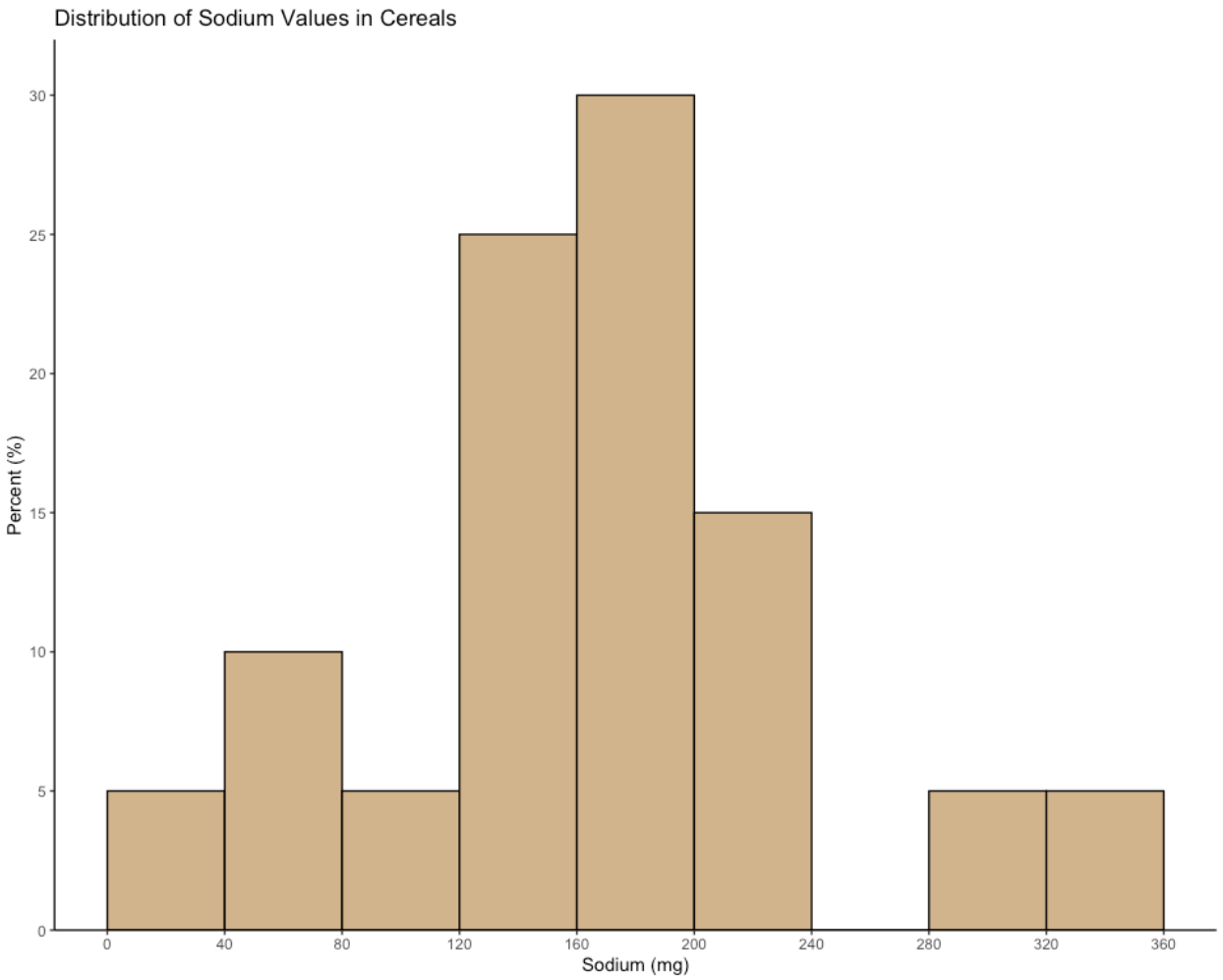
Adjusting x-axis labels:

```
ggplot(data.frame(sodium), aes(x = sodium)) +
  geom_histogram(breaks = seq(0,360,40), color="black", fill="tan") +
  labs(x = 'Sodium (mg)', y = 'Frequency',
       title="Distribution of Sodium Values in Cereals") +
  scale_y_continuous(limit = c(0,7),
                     breaks = 1:7,
                     expand = c(0,0)) +
  scale_x_continuous(breaks = seq(0,360,40)) +
  theme_classic() +
  theme(panel.grid.minor = element_blank(),
        text=element_text(size = 14))
```



Plotting percentages rather than counts on the y-axis:

```
ggplot(data.frame(sodium),
       aes(x = sodium, y = 100 * (..count.. / sum(..count..)))) +
  geom_histogram(breaks = seq(0,360,40), color = 'black', fill = 'tan') +
  labs(x = 'Sodium (mg)', y = 'Percent (%)',
       title = 'Distribution of Sodium Values in Cereals') +
  scale_y_continuous(limit = c(0,32),
                     breaks = seq(0,30,5),
                     expand = c(0,0)) +
  scale_x_continuous(breaks = seq(0,360,40)) +
  theme_classic() +
  theme(panel.grid.minor=element_blank())
```



R actually defines intervals open to the left and closed to the right. To get the histograms perfectly match the ones in the textbook, use `closed = 'left'`:

```
ggplot(data.frame(sodium),
       aes(x = sodium, y = 100 * (..count.. / sum(..count..)))) +
  geom_histogram(breaks = seq(0,360,40), closed = 'left', color = 'black',
fill = 'tan') +
  labs(x = 'Sodium (mg)', y = 'Percent (%)',
       title = 'Distribution of Sodium Values in Cereals') +
  scale_y_continuous(limit = c(0,32),
                     breaks = seq(0,30,5),
                     expand = c(0,0)) +
  scale_x_continuous(breaks = seq(0,360,40)) +
  theme_classic() +
  theme(panel.grid.minor = element_blank())
```