Section 3.5

The Five-Number Summary

The **five-number summary** of a set of data consists of the smallest data value, Q_1, the median, Q_3, and the largest value of the data.

Example 1

To illustrate, let's again look at those exam scores from Example 4 in Section 3.4.

48 57 58 65 68 69 71 73 73
74 75 77 78 78 78 79 80 85
87 88 89 89 89 95 96 97 99

Find the five-number summary.

[reveal answer]

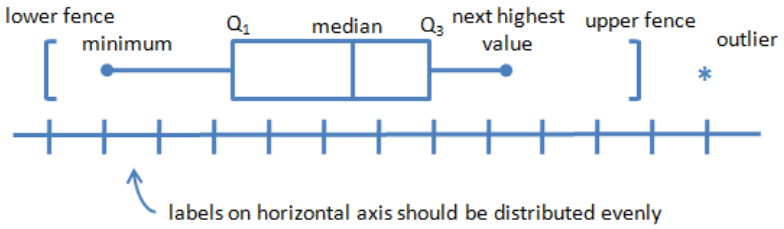
Boxplots

Using the five-number summary and the fences, we can create a new graph called a **boxplot**.

Drawing a Boxplot

Step 1: Determine the five-number summary and the lower and upper fences.
Step 2: Draw a horizontal line and label it with an appropriate scale.
Step 3: Draw vertical lines at Q_1 , M, and Q_3. Enclose these vertical lines in a box.
Step 4: Draw a line from Q1 to the smallest data value that is within the lower fence. Similarly, draw a line from Q3 to the largest value that is within the upper fence.
Step 5: Any values outside the fences are outliers and are marked with an asterisk (*).

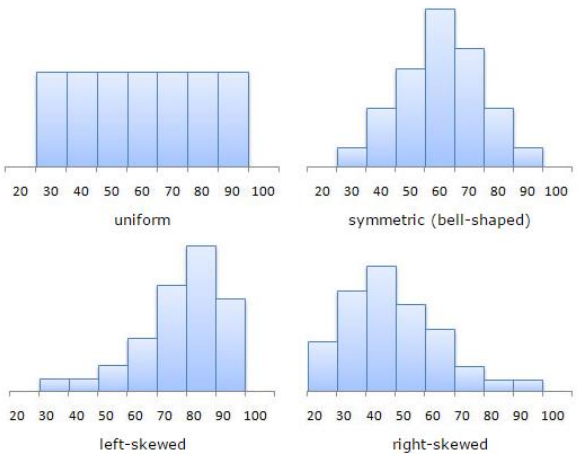
A typical boxplot will look something like this:



Boxplots and Distribution Shape

The last thing we want to talk about in Chapter 3 is the relationship between the shape of a boxplot and the shape of the distribution.

In Section 2.2, we talked about distribution shape, showing the following four standards:



Example 2

To illustrate, let's again look at those exam scores from Example 4 in Section 3.4.

48 57 58 65 68 69 71 73 73
74 75 77 78 78 78 79 80 85
87 88 89 89 89 95 96 97 99

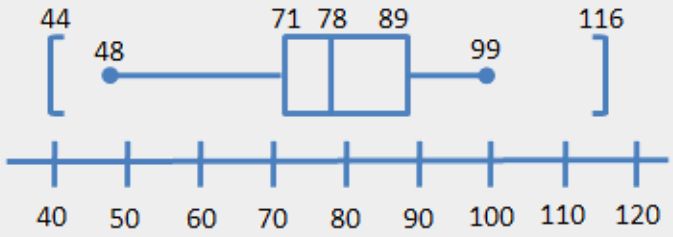
Take a moment and try to sketch a boxplot of this data set, following the description above.

[reveal answer]

Using the five-number summary from Example 1 above and the outlier calculation from Example 5 in Section 3.4, we have the following information:

minimum = 48
Q_1 = 71
median 78
Q_3 = 89
maximum = 99
Lower fence = 44
Upper fence = 116

A boxplot would then look something like this:



Technology

Here's a quick overview of how to create box plots in StatCrunch.

1. Enter or import the data.
2. Select **Graphics** > **Box Plot**.
3. Select the column(s) you want to create a box plot for.
4. Click **Next**.
5. Check "Use fences to identify outliers" and click **Next**.
6. Enter any modifications and click **Next**.
7. Choose a color scheme, if you wish, and click **Create Graph!**