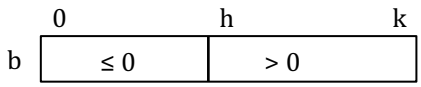
Array Pictures as Assertions

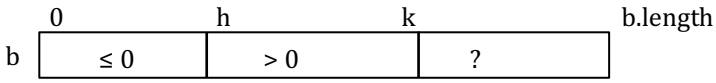
In this short video, we introduce a picture-notation to describe assertions on arrays.

Consider the assertion `b[0..h-1] <= 0 && b[h..k] > 0`. We can draw it as a picture like this:



The indexes 0, `h`, and `k` are placed above the rectangle that describes the array. In each segment is some indication of what property the elements in the segment have. For example, we place "`≤ 0`" in the first segment to indicate that all its values are at most 0.

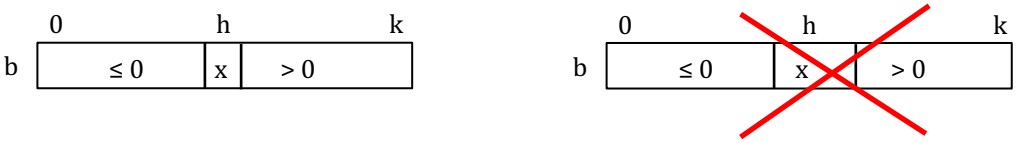
We have not written a picture of the whole array. We might write the whole array, with the question mark indicating that we know nothing about what is in that segment:



But when picturing the assertion `b[0..h-1] ≤ 0 && b[h..k] > 0`, there is no need to draw that third segment.

Including a 1-element segment

In the diagram below, the array segment marked `b[h]` contains one value, so that segment is drawn so that one can understand that it contains exactly one value. Drawing it instead as shown on the right leads to confusion and mistakes because the segment no longer looks like a one-element segment. Don't do that!



Don't draw variables and numbers directly above a line

Too often, we see an assertion pictured like this:

Here, h is directly above the line, so the reader doesn't know whether the first segment is b[0..h] or b[0..h-1]. Don't do this! You *have* do be careful and precise when drawing such array pictures. *Never* put an integer or a variable directly above a line.

Use whichever notation you want for an assertion

You can write an assertion completely in mathematics, as in `b[0..h-1] <= 0 && b[h..k] > 0`, in English, in a mixture of English and mathematics, as a picture, as shown above, as a mixture of a picture, English, and math, it doesn't matter. What *does* matter is being precise, clear, unambiguous, and thorough.