Shown below is a data stream with *N* = *22* and the current bucket configuration. New elements enter the window at the right. Thus, the oldest bit of the window is the leftmost bit shown.

[1 0 1 1 0 0 0 1] 0 **[1 1 1 0 1] [1 0 0 1]** 0 **[1] [1]** 0

1. What is the largest possible bucket size for *N* = *22*?
2. What is the estimate of the number of 1's in the latest *k* = *15* bits of this window?
3. The following bits enter the window, one at a time: 1 0 1 1 1 0 0 1. What is the bucket configuration in the window after this sequence of bits has been processed by DGIM?
4. After having processed the bits from (3), what is now the estimate of the number of 1's in the latest *k* = *15* bits of the window?
5. In the file *extension_DGIM.pdf* you find 2 slides that explain how to generalize the DGIM algorithm from a bit stream to positive integers. Analogously to the slide example, work out the bit streams for the following stream of 8 numbers (oldest first): (125, 2, 77, 5, 13, 9, 99, 56). Compute the result for *k* = *3*.