Observe that the **while** loop of lines 5-7 of the INSERTION-SORT procedure in Section 2.1 uses a linear search to scan (backward) through the sorted subarray $A[1\,..\,j-1]$. Can we use a binary search (see Exercise 2.3-5) instead to improve the overall worst-case running time of insertion sort to $\Theta(n \lg n)$?

Solution.

No. Although we can now *find* the point to insert $A[j]$ into the sorted subarray $A[1\,..\,j-1]$ in at most $\Theta(\lg n)$ time, in the worst case it will still take $\Theta(n)$ time to actually *insert* the element.