1. List the members of your group below. Underline your name.

2. Depict the transformations to the following top-down splay tree in response to the access pattern 1, 2, 3, 4, 5. Depict all splay operations clearly, including the left and right trees, and highlight the tree after all operations for each insertion have completed.
3. A subsequence of sequence $S$ is any sequence that can be obtained from $S$ by deleting zero or more of its elements. For example, $(1, 4, 9, 2)$ is a subsequence of $S_1 = (3, 1, 4, 5, 9, 2)$, but $(1, 9, 4)$ is not. A subsequence $S'$ of $S$ is called a $k$-subsequence if each pair of adjacent elements in $S'$ has $k-1$ intermediate elements in $S$. For example, $(1, 5, 2)$ is a 2-subsequence of $S_1$, and $(3, 5)$ is a 3-subsequence of $S_1$, but $(1, 5, 9)$ is not a $k$-subsequence of $S_1$ for any value of $k$ (although it is a subsequence of $S_1$). A $k$-subsequence with $n$ elements is called maximal if there is no $k$-subsequence with $n + 1$ elements. List all maximal 5-subsequences and maximal 7-subsequences of the following sequence:

$$\begin{array}{cccccccccccc}
50 & 40 & 60 & 70 & 65 & 75 & 62 & 63 & 41 & 42 & 51 & 52 & 53 & 54 \\
\end{array}$$

4. We say a sequence is $k$-sorted if all of its $k$-subsequences are sorted. For each of the following, provide an example of a sequence with the indicated properties, or explain why no such sequence exists.

(a) 7-sorted but not 5-sorted.
(b) 5-sorted but not 7-sorted.
(c) 6-sorted but not 3-sorted.
(d) 3-sorted but not 6-sorted.
5. Sort the following array in ascending order using *shellsort with increment sequence* 
\((1, 5, 7)\).\(^1\) Depict the state of the array after each \(k\)-sort, for \(k = 1, 5, 7\) and highlight the moved elements at each stage.