

Solution to Linear and Binary Search Exercises

1. When the item number is 60, the QOH is 19. 11 comparisons are needed for the linear search. 3 comparisons are needed for the binary search.
2. When the item number is 89, the QOH is 10. 1 comparison is needed for the linear search. 5 comparisons are needed for the binary search.
3. The first comparison in Evo's linear search will always be with the element at array index 0. The first comparison in Evo's binary search will always be with the element at array index 13.
4. Based upon the algorithm in Figure 3, the first comparison occurs for an index of $[0+(33-1)]/2 = 16$, the middle element in the array.
5. The item number is not found. 28 comparisons are needed for the linear search. 4 comparisons are needed for the binary search.
6. Maximum is n . Minimum is 1. Average would be $(n+1)/2$.
7. For item number searches 54, 33, 42, 84, and 61, the number of comparisons is 5, 4, 3, 2, and 1, respectively. It looks as though the minimum number of is 1, and the maximum number is 5.
8. For the Evo binary search, $\log_2 n + 1 = \log_2 28 + 1 = 4.81 + 1 = 5.81$. Therefore, the maximum number of searches is 5 (greatest integer not greater than 5.81).
9. $\log_2 1000 + 1 = 9.97 + 1 = 10.97$. Therefore, the maximum number of searches is 10 (greatest integer not greater than 10.97).
10. Linear search: $O(n)$. Binary search: $O(\log n)$.