Algorithms Worksheet: Binary Search

1. Explain the basic idea of binary search on a sorted array.

2. Implement the binary search algorithm in pseudocode.

Input: A sorted list L and a search value x
Output: The index of x in L, or -1 if not found
begin

0
end

3. For each of the following arrays, draw the elements that the binary search algorithm examines while searching for the given value.

   (a) $A = [2, 5, 6, 9, 11, 15, 19], x = 6$

   (b) $A = [2, 3, 5, 6, 7], x = 2$

   (c) $A = [1, 1, 1, 3, 3], x = 4$

4. How can the binary search concept be applied in searching in other data structures, such as trees or graphs?

5. What are some potential pitfalls or limitations of the binary search algorithm, and how can they be mitigated?

6. Implement a recursive version of the binary search algorithm in pseudocode.

Input: A sorted list L, a search value x, a start index s and an end index e
Output: The index of x in L, or -1 if not found
begin

0
end