Q1: Suppose we have an array Arr = <7,3,8,8,5,2,7,9,1>. How to sort Arr using merge sort? Draw the sorting steps.

Q2:

Consider a sorted sequence of n numbers <a_1, a_2,...,a_n> stored in array A[1:N] and a value x. You need to design a **recursive binary search algorithm** to determine whether x is in the sequence or not. The algorithm should return TRUE if x is found and FALSE otherwise. The algorithm must have a worst-case time complexity of $O(log_2 n)$.