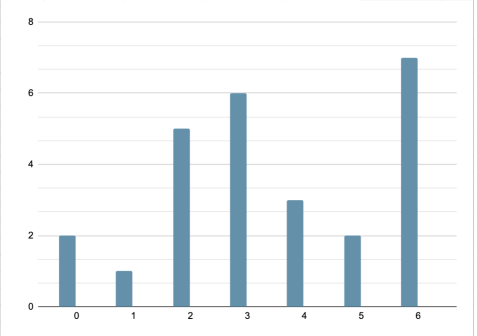
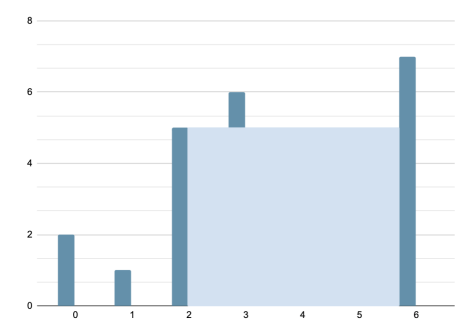
Array/String

Answer the following problems in pseudocode or an appropriate language of your choice.

1. Given an array of positive integers which represent the height of vertical boundary lines, find the area of the largest rectangle that can be bound by the x-axis and two of these vertical boundary lines. The height of the rectangle may not exceed the height of either vertical boundary.

   Ex. arr = [2, 1, 5, 6, 3, 2, 7]





   $Area_{max}$ = arr[2] * (6 - 2) = 5 * 4 = 20

2. Given an array of integers sorted from least to greatest, remove duplicate values and return the array.

   Ex.
   [1, 2, 3, 3, 4, 4, 4, 5, 6, 6, 7, 8, 9, 9] → [1, 2, 3, 4, 5, 6, 7, 8, 9]
   [-52, -14, -14, -4, 9, 9, 18] → [-52, -14, -4, 9, 18]

3. Given two sorted ascending integer arrays, merge these arrays into a single sorted array, including duplicates.

   Ex.

   [1, 4, 5], [2, 4, 7] → [1, 2, 4, 4, 5, 7]
   [-4, 1, 7, 9], [1, 6] → [-4, 1, 1, 6, 7, 9]

4. Given a string, return true if the string can be constructed out of a repeating substring, and false otherwise.

   Ex.

   “catcatcat” → True, substring “cat” is repeated three times
   “catacat” → False, no substring can construct string

5. Given a string, return the index of the first unique character in the string

   Ex.

   “abracadabra” → 4, “c” is first unique character at index 4

6. Given a string, return the index of the first character that is repeated in the string

   Ex.

   “stringing” → 3, “i” is first repeated character at index 3