1. Suppose we randomly order the numbers \{1, 2, \ldots, n\}, producing a list \(a_1, a_2, \ldots, a_n\). We say that \(a_i\) is good if \(a_i = \text{median}(a_1, a_2, a_3, \ldots, a_i)\). What is the expected total number of good items \(a_i\)? You can express your answer as a summation if you like.

2. True or False: given a list \(a_1, \ldots, a_n\), one can output a sorted list of the smallest \(n^{1/3}\) items in \(O(n)\) time.

3. What is an algorithm with the smallest number of comparisons you can find for outputting both the maximum and the minimum of \(n\) numbers?