 def bucketsort( A ):

  # get hash codes

  code = hashing( A )

  buckets = [list() for \_ in range( code[1] )]

  # distribute data into buckets: O(n)

  for i in A:

    x = re\_hashing( i, code )

    buck = buckets[x]

    buck.append( i )

  for bucket in buckets:

    insertionsort( bucket )

  ndx = 0

  # merge the buckets: O(n)

  for b in range( len( buckets ) ):

    for v in buckets[b]:

      A[ndx] = v

      ndx += 1

import math

def hashing( A ):

  m = A[0]

  for i in range( 1, len( A ) ):

    if ( m < A[i] ):

      m = A[i]

  result = [m, int( math.sqrt( len( A ) ) )]

  return result

def re\_hashing( i, code ):

  return int( i / code[0] \* ( code[1] - 1 ) )