1. (20 points)
   (a) Explain how to find the maximum of \( n \) numbers in time \( O(\log n) \) on a EREW PRAM with \( p = n \) processors.
   (b) What is the efficiency of this algorithm? Start with a definition of efficiency.
   (c) State the folding principle in terms of the time \( T(n, p) \) used by a parallel algorithm on an input of size \( n \) with \( p \) processors. What does this version of the folding principle say about the time for this algorithm with only \( p = n/\log n \) processors?
   (d) State the folding principle in terms of the efficiency \( E(n, p) \) of a parallel algorithm on an input of size \( n \) with \( p \) processors. What does this version of the folding principle say about the efficiency of this algorithm with only \( p = n/\log n \) processors?

2. (20 points) We consider the problem of merging two sorted arrays \( A \) and \( B \), each containing \( n \) integers, into one sorted array \( C \) of size \( 2n \).
   (a) Give an algorithm that runs in time \( O(\log n) \) on an EREW PRAM with \( p = n \) processors.
   (b) Give an algorithm that runs in time \( O(1) \) on a CRCW-common PRAM with \( p = n^2 \) processors.

3. (20 points)
   (a) Give a parallel algorithm to add two \( n \) bit integers \( A \) and \( B \) (stored in bit arrays) that runs in time \( O(\log n) \) on an CREW PRAM with \( n \) processors.
   (b) Give a parallel algorithm to add two \( n \) bit integers \( A \) and \( B \) (stored in bit arrays) that runs in time \( O(\log^2 n) \) on an EREW PRAM with \( n \) processors.