

DEPARTMENT OF MATHEMATICS, FACULTY OF SCIENCE, UU.
MADE AVAILABLE IN ELECTRONIC FORM BY THE \mathcal{TC} OF A-Eskwadraat
IN 2005/2006, THE COURSE WISM459 WAS GIVEN BY ROB H. BISSELING.

Parallel Algorithms, midterm examination (WISM459) October 19, 2005

Each of the five questions is worth 10 points. Total time 45 minutes.

Question 1

Explain the BSP parameters p, r, g, l .

Question 2

What is the value h of the h -relation defined by the following table?

	$P(0)$	$P(1)$	$P(2)$	$P(3)$
$P(0)$		19	10	
$P(1)$	19		5	6
$P(2)$	21	10		
$P(3)$	9	5	6	

In the table, the value in row s and column t is the number of data words that processor $P(s)$ sends to processor $P(t)$, for $0 \leq s, t < 4$.

Question 3

Explain the difference between local and global indices. Use the cyclic distribution of a vector for your explanation.

Question 4

Let $k \geq 0$ be an integer. Assume $p \geq 2$. What is the communication cost of shifting a cyclically distributed vector \mathbf{x} k places to the right, i.e., assigning $y_{(i+k) \bmod n} = x_i$? The length of the input and output vectors is n .

Question 5

Give a BSP algorithm for processor $P(s)$ (in the notation we learned) for the computation of the output vector \mathbf{y} defined by $y_i = x_i + x_{n-1-i}$, for $0 \leq i < n$, starting from a given input vector \mathbf{x} . The length of the vectors is n . Assume both vectors are block distributed and that $n \bmod p = 0$.