

Submission deadline: Monday, Nov. 3, 2008 11:59:59 am CET

## Exercises

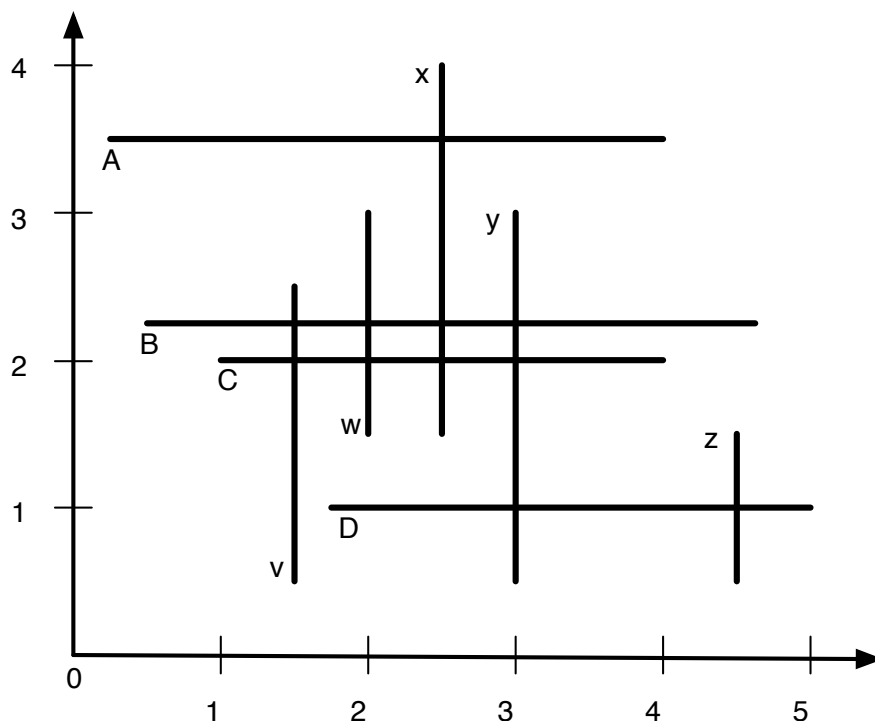
**Algorithm theory**

Winter term 2008/09

## Exercise sheet 2

**TASK 1 (1 point):**

Report all line segment intersections using the lecture's algorithm. Show each set  $S$  for each divide step and the output of the merge steps.

**TASK 2 (1 point):**

Consider the following polynomials over  $\mathbb{C}[x]$ :

$$\begin{aligned} p(x) &= 17x^5 + 4x^3 - 3x^2 + 27 \\ q(x) &= 6x^4 + x^3 - 7x^2 + 2x + 1 \\ r(x) &= x^2(x - i)^3 + (x + i)^2 \end{aligned}$$

1. Compute  $p(x) \cdot q(x)$  and count the number of computational steps you need (addition and multiplication).
2. Expand  $r(x)$  and then evaluate  $r(x)$  at all four principal roots of unity ( $1, i, -1, -i$ ) using the Horner scheme.