

## Solution to Problem 19

**Problem.** Suppose that  $A, B$  are r.e. sets. If a number  $n$  appears in the  $A$ -generating algorithm at moment 3 and in the  $B$ -generating algorithm at moment 2, when will this number appear in the algorithm generating all elements of the intersection of  $A$  and  $B$ ?

**Solution.** According to the lecture, if a number was generated by the  $A$ -generating algorithm at time  $k$  and by the  $B$ -generating algorithm at time  $\ell$ , then it is produced by the intersection-generating algorithm by the time  $\max(2k - 1, 2\ell)$ .

In this problem,  $k = 3$  and  $\ell = 2$ , so the number  $n$  will be produced by the intersection-generating algorithm by the time  $\max(2 \cdot 3 - 1, 2 \cdot 2) = \max(5, 4) = 5$ .