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 \( \max(2 \cdot 3 - 1, 2 \cdot 2) = \max(5, 4) = 5 \).