Quiz 3 (*Oct. 3, Marks: 6, Duration: 20 mins*) **COL750, Jul-Dec 2024**

Name: **Entry No.:**

1. Let $\mathcal{A}_1$ and $\mathcal{A}_2$ be two automata that we can regard as either NFA (Non-deterministic Finite Automata) or as NBA (Non-deterministic Büchi Automata). Let us define equivalence relations $\equiv_{NFA}$ and $\equiv_{NBA}$ between the automata, as follows:

   $\mathcal{A}_1 \equiv_{NFA} \mathcal{A}_2$ *iff* $\mathcal{L}(\mathcal{A}_1) = \mathcal{L}(\mathcal{A}_2)$
   $\mathcal{A}_1 \equiv_{NBA} \mathcal{A}_2$ *iff* $\mathcal{L}_\omega(\mathcal{A}_1) = \mathcal{L}_\omega(\mathcal{A}_2)$

   Answer the following, and justify your answer:

   (a) If $\mathcal{A}_1$ and $\mathcal{A}_2$ accept the same finite words, i.e. $\mathcal{A}_1 \equiv_{NFA} \mathcal{A}_2$, does this mean that they also accept the same infinite words?

   (b) If $\mathcal{A}_1$ and $\mathcal{A}_2$ accept the same infinite words, i.e. $\mathcal{A}_1 \equiv_{NBA} \mathcal{A}_2$, does this mean that they also accept the same finite words?