Quiz 3 (*Sep 8, Marks: 3, Duration: 30 mins*) **COL703, Aug-Nov 2022**

Name: **Entry No.:**

1. Recall that α is said to be *consistent* if $\nvdash \neg\alpha$. Suppose that $\vdash \alpha \to \beta$. For the following statements, answer whether they are true or not, and provide an explanation. Answers with missing or inadequate explanations will not get any marks.

   (a) **[0.5 marks]** If α is consistent then β is consistent.

   (b) **[0.5 marks]** If β is consistent then α is consistent.

2. **[1 marks]** Prove, in Hilbert's proof system, that $(\alpha \to \neg\neg\alpha)$.

3. **[1 marks]** Prove, in Hilbert's proof system, that $(\alpha \to \beta) \to ((\delta \to \gamma) \to ((\alpha \vee \delta) \to (\beta \vee \gamma)))$. Feel free to rewrite $\vee$ is terms of $\neg$ and $\to$ if you need to.