

COL703: Logic for Computer Science

Sat 09 Oct 2021

Quiz 4

20+5+5 minutes

Max marks 10

Instructions:

1. Download the paper.
2. Write your name and entry number in the designated space on top and *do not forget to sign the honour statement below*.
3. Answer the question(s) in the appropriate space provided starting from this page.
4. Scan the paper with your completed answer.
5. Upload it on Gradescope 2001-COL703 page within the given time. *Make sure the first page with your name, entry no and signature is also the first page of your uploaded file*
6. Late submissions (within 2 minutes of submission deadline) on the portal will attract a penalty of 2 marks out of 10.
7. Email submissions after the closing of the portal will not be evaluated (You get a 0).
8. Uploads without the first page details (including signature) will be awarded 0 marks.

I abide by the Honour code that I have signed on my admission to IIT Delhi. I have neither given any help to anybody nor received any help from anybody in solving the question(s) in this paper.

Signature:

Date:

10 marks

Assume you are given proof trees

$$\begin{array}{c} \nwarrow \mathcal{T}_0 \nearrow \\ \vdash_{\mathcal{H}_0} \neg\phi \rightarrow \neg\psi \rightarrow \neg\chi \rightarrow \phi \rightarrow (\neg\psi \rightarrow \chi) \end{array}$$

and

$$\begin{array}{c} \nwarrow \mathcal{T}_1 \nearrow \\ \vdash_{\mathcal{H}_0} \neg\phi \rightarrow \neg\psi \rightarrow \chi \rightarrow \phi \rightarrow (\neg\psi \rightarrow \chi) \end{array}$$

Construct the proof tree

$$\begin{array}{c} \nwarrow \mathcal{T} \nearrow \\ \vdash_{\mathcal{H}_0} \neg\phi \rightarrow (\neg\psi \rightarrow (\phi \rightarrow (\neg\psi \rightarrow \chi))) \end{array}$$

from the above proof trees using the system \mathcal{H}_0 . You are not allowed to use any of the rules of the system \mathcal{G} . However you may use any of the derived rules upto and including those in Exercise 15.2.