COL703: Logic for Computer Science

Sat 14 Aug 2021 **Quiz 1** 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:**

Let $f : \mathbb{N} \to \mathbb{m}$ and $g : \mathbb{N} \times \mathbb{N} \times \mathbb{N} \to \mathbb{m}$ be defined as follows.

$$f(n) = \begin{cases} n & \text{if } 0 \leq n \leq 1 \\ f(n-1) + f(n-2) & \text{if } n > 1 \end{cases} \qquad g(n,a,b) = \begin{cases} a & \text{if } n = 0 \\ b & \text{if } n = 1 \\ g(n-1, b, a+b) & \text{if } n > 1 \end{cases}$$

Prove that for all $n \in \mathbb{N}$, $f(n) = g(n, 0, 1)$.