

Sat 06 Feb 2021

**COL226: Programming Languages****Quiz 1**

30 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 2002-COL226 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) may be awarded 0 marks.

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**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 or any site on the internet in solving the question(s) in this paper.**

**Signature:****Date:**

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Consider a set of *valid bit strings* (i.e strings composed of only 0s and 1s) defined by the following rules.

1. 01 is a valid bitstring,
2. If  $s$  is a valid bitstring then  $0s1$  is a valid bitstring,
3. If  $s$  and  $t$  are valid bitstrings then  $st$  is a valid bitstring and
4. No other bitstring is a valid bitstring.

Let  $\#0(s)$  denote the number of 0s in  $s$  and  $\#1(s)$  the number of 1s in  $s$ . Prove that  $\#0(s) = \#1(s)$  for every valid bitstring  $s$ .