

# ELL781: Minor Test I

August 27, 2016

Maximum Marks: 15

1. Consider a cricket tournament being held involving 4 teams: Delhi Daredevils (DD), Gujarat Lions (GL), Kolkata Knight Riders (KKR), and Mumbai Indians (MI). Each pair of teams is supposed to play twice, once at each of teams' home grounds. So far the following games have already happened (the home team is mentioned first and in bold):

- **GL** vs. DD
- **KKR** vs. MI
- **DD** vs. KKR
- **MI** vs. GL

Assuming that each team can play only one game every two days, find a schedule for the remaining games such that the tournament is completed in the minimum number of days. (Hint: You need to demonstrate a systematic approach for doing so, by transforming the problem into a more abstract/general problem. The graph colouring problem discussed in class is one possibility. Please show all your working clearly.) [8]

2. Suppose you have two sorted lists of integers. Write pseudocode for merging them into a third list. Your pseudocode should take the form of a function that takes the two sorted lists as arguments and returns the merged list. (Hint: You can assume the abstract data type *LIST* with all the standard list operations available: *INSERT*, *LOCATE*, *RETRIEVE*, *DELETE*, *FIRST*, *NEXT*, *PREVIOUS*, *END*.) [4]
3. Show that if  $T(n) = T(n/3) + T(2n/3) + cn$  ( $c$  is a constant), then  $T(n)$  is  $\Omega(n \log n)$ , by:
  - (a) Taking the given solution to be a guess and showing its correctness.
  - (b) Getting to a closed form via substitution (draw the recursion tree). [3]