

Extra Credit Problem to Boost Midterm Scores

May be Completed by Teams of 2

Due in my inbox no later than 23:59:59 on Thursday March 28

1. [Definition of LD] Consider the use of non-negative integers to represent lists in the class LD, where LD consists of nonempty lists whose members are either digits or themselves members of LD. One idea might be to use 1 to stand for the left paren (, and 2 to stand for the right paren ). We would want 1 and 2 to be used as digits as well as end markers (but never both at the same time).

Here are some examples of what I have in mind:

112 represents (1)

1112 represents (1 1)

1122 represents (1 2) -- note that our setup would have 12 representing () if we allowed LD to contain the empty list

and

(8 (1 2 (3)) (5 6 1))

would be represented as

181121322156122

2. [Definition of LD-number] An integer arising in this way will be called an LD-number. Thus 112, 1112 and 1122 are LD-numbers, but 12 is not and neither is 143.

3. [Problem Statement] Observe that multiple elements of LD can generate a given LD-number. Given this, it makes sense to ask: how many different elements of LD are represented by a given LD-number?

4. [Further Instructions] Team mates do not need to be from the same section. Each team should submit just one paper, displaying the name and email address for each team member. Each document should present a full development leading to working (and tested) code.

Teams may NOT consist of more than two people.