Problem of the Week
Problem D and Solution
The Queue

Problem

Five people, Avery, Bethany, Ceilidh, Deanna and Eartha, each with different heights, are standing in a line. They all line up facing the same direction towards the front of the line. Each person counts the number of people in front of them who are taller and the number of people behind them who are taller. The information is recorded in the following table:

Name of person	Number of taller people in front	Number of taller people behind
Avery	1	2
Bethany	3	1
Ceilidh	1	0
Deanna	0	0
Eartha	2	0

Determine the order that the five people are standing in. Then list the people in order from tallest to shortest.

Solution

Since Deanna has no one taller in front of her and everyone else has someone taller in front of them, Deanna must be first in line. And since she also has no one taller behind her, she must be the tallest.

Deanna				

Since Bethany has three taller people on front of her and one behind her, she must be in the fourth position. This also means that she is the fifth tallest. That is, Bethany is the shortest in the line.

Deanna			Bethany	

Since Avery has two taller people, Ceilidh and Eartha, behind her, then she must be in the second position. This makes her the fourth tallest, only Bethany is shorter.

Deanna	Avery		Bethany	

Finally, Eartha can be either in the third spot or the fifth spot. If she is in the third spot, then the two people in front of her, Deanna and Avery, would be taller than her. However Avery is only taller than Bethany. This is a contradiction since Avery cannot be both taller and shorter than Eartha. Therefore, Eartha cannot be in the third spot and must in the fifth spot. This also makes Ceilidh taller than Eartha.

Therefore, from the front of the line, the order in which they at standing is

Deanna	Avery	Ceilidh	Bethany	Eartha

The order from tallest to shortest is: Deanna, Ceilidh, Eartha, Avery and Bethany.

It should be noted that the order of height could have been determined from the information provided in the original table. When you add the number of people taller in front to the number of people taller behind, the smaller the sum the taller the person.

NOTE: This question is similar to a question found on the Beaver Computing Challenge (BCC) which is usually written in November. BCC information and past challenges can be found at http://cemc.uwaterloo.ca/contests/bcc.html.