Code Jam 2014 - Qualification Round

Analysis: Magic Trick

In the first arrangement, when the volunteer tells the magician the row that contains her card, the magician is able to see a set of four cards in that row. Similarly, in the second arrangement, the magician is able to see another set of four cards in the selected row.

Therefore, after hearing the two volunteerâ€™s answers, the magician will have two sets of cards:
- the first set of four cards that lie in the selected row in the first arrangement, and
- the second set of four cards that lie in the selected row in the second arrangement.

To know which card the volunteer chose, the magician must be able to find exactly one card that is in both sets (i.e., the intersection size of the two sets must be equal to one). If there is more than one card that is in both sets (i.e., the intersection size is bigger than one), then it means the magician can not determine which card the volunteer chose since there are more than one possible card that could have been chosen by the volunteer (the magician did a bad job). If none of the card in the first set is in the second set (i.e., the intersection size is zero), then there is no card consistent with the volunteer's answers (the volunteer cheated).

The sample input covers all three possible cases:

In Case #1, the two sets are {5, 6, 7, 8} and {9, 10, 7, 12}. There is exactly one card (i.e., card 7) that is in both sets, and thus the volunteer chosen card must be 7.

In Case #2, the two sets are {5, 6, 7, 8} and {5, 6, 7, 8}. The card chosen by the volunteer can be any of {5, 6, 7, 8} because all of them contains in both sets. Bad magician!

Lastly, in Case #3, the two sets are {5, 6, 7, 8} and {9, 10, 11, 12}. None of the cards in the first set is in the second set. The volunteer must have cheated!