

CS410 Homework - 3

*Disclaimer: You are **allowed** to use any **pre-defined or built-in functions** that we have **covered in class (slides)**. Any other helper functions if needed needs to be written as part of the submission. Submit a single source file that contains all functions.*

Question 1 of 1: [100 marks] Costco has compiled a list of items bought by their customers. These items are represented as IDs. The list of all items and their respective IDs are provided as:

1. 1x Lettuce
2. 1x Orange
3. 1x Banana
4. 1x Noodle pack
5. 1x Milk
6. 1x Egg
7. 1x Cheese
8. 1x Chips packet
9. 1x Soda Bottle
10. 1x Royale with cheese

Customers buy varying items from this list in different orders.

For example:

- Customer1 = [5, 3, 4, 8, 3, 3, 3]
Which means, *customer one* has bought 1 milk bottle (5), 1 noodle pack (4), 1 pack of chips (8) and 4 bananas (3)
- Customer2 = [8, 3, 2, 2, 3]
Which means, *customer two* has bought 1 pack of chips (8), 2 bananas (3), and 2 oranges (2).
- Customer3 = [6, 1, 9, 9, 6, 1, 3, 2, 3]
Which means, *customer three* has bought 2 Eggs (6), 2 lettuces (1), 2 soda bottles (9), 2 bananas (3) and 1 orange (2)
- Customer4 = [3, 10, 3]
Which means, *customer four* has bought 2 bananas (3) and 1 Royale with cheese (10)

Costco just wants to know if there are any items that all their customers buy. In the example case above, the four customers buy different quantities of differing items, but all of them have something in common. **The customers above, all buy at least two bananas.**

These lists are compiled as a list of customer items for different customers. You will be given a list of lists with these items. For example, for the customers above, you shall be **provided with a list of lists such as** : [[5, 3, 4, 8, 3, 3, 3], [8, 3, 2, 2, 3], [6, 1, 9, 9, 6, 1, 3, 2, 3], [3, 10, 3]]

The company wants to compile a list of items **that are always bought**. Your goal is to write a function (along with helper functions) that will consume a list of lists and return the common set of items bought by all customers.

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You will name this function, **shared**.

For example:

- **shared** [[5, 3, 4, 8, 3, 3, 2], [8, 4, 2, 2, 3]]
Should return the list [3, 4, 8, 2]
Where items 3, 4, 8 and 2 are the common items bought by both the customers
- **shared** [[5, 3, 4, 8, 3, 3, 3], [8, 4, 2, 2, 3], [6, 1, 9, 9, 6, 1, 3, 1, 2], [9, 7, 10]]
Should return an **empty** list
As there are **NO** common items among any customers
- **shared** [[9, 6, 10, 6, 6, 6], [10, 4, 6, 7, 6]]
Should return the list [6, 6, 10]
As both the customers bought 2 of item 6 and bought 1 of item 10

The order of the list of returned elements does not matter. Please properly comment your code before submission.

For this assignment, name your function as **shared** and include it in addition to any other helper functions in the source file **HW3_WSUID.hs**. For example, if your user ID is A999B999 name your file as **HW3_A999B999.hs**.

Sample Test cases:

<u>Test case 1:</u> shared [[10, 5, 10, 10, 7, 10], [2, 6, 10, 10]] Output: [10, 10]	<u>Test case 2:</u> shared [[2, 8, 6, 5, 8, 8, 8], [8, 8, 1, 1, 4, 8], [3, 3, 8, 10, 8, 10, 8, 7, 8, 8, 3]] Output: [8, 8, 8]
<u>Test case 3:</u> shared [[1, 2, 3, 4], [5, 6, 7], [8], [9, 10]] Output: []	<u>Test case 4:</u> shared [[2, 2, 4, 8]] Output: [2, 2, 4, 8]