Assignment 8: Branch and bound algorithms

Due: 1st class after 15/1/2018 (submission through moodle before sessional class)

All Sections

Implement a branch and bound algorithm for the **set cover** problem (https://en.wikipedia.org/wiki/Set_cover_problem). Your algorithm must be optimal i.e. needs to output the minimum number of sets needed to cover the universe as well as the sets picked.

At each node branch out by trying each of the remaining sets and then removing all the elements in the set picked from the universe set as well as from all remaining sets.

You may use the following as a lower bound for pruning the branch and bound tree:

Number of sets picked so far + (Number of elements not covered so far)/(Maximum cardinality of the remaining sets)

Input: The number of elements in the universe, *n* and number of subsets, *m* in the first line followed by *m* lines each containing elements in one subset. For example –

5 4
1 2 3
2 4
3 4
4 5

Output: Minimum number of sets needed to cover the universe and the subsets picked. For the input above, the output should be

2
1 2 3
4 5