Vertex Cover Problem

Input : An undirected graph G = (V, E) and a nonnegative integer k.
Question: Does there exist a subset of vertices C ⊆ V with k or fewer vertices such that each edge in E has at least one of its endpoints in C ?.
Output: If such a subset exists return that subset, otherwise return NO.

1. Implement a brute force algorithm for the vetex cover problem.
2. Implement a fixed parameter algorithm (O*(2^k) complexity) for the vertex cover problem.

Implementations must be command-line programs which receive the graph on standard input and write the solution to standard output. Programming languages such as C, C++, Java and Python can be used. To improve comparability, implementations must use only a single CPU thread.

Input Format. The graph format is a simple text format, where each line describes one edge, given by its two endpoints separated by a white space. A line with a single endpoint describes degree zero vertices **Example:**

```
ml mr
l1 ml
l2 ml
l1 l2
r1 mr
r2 mr
r1 r2
m2
m3
```

Vertex names can be any combination of letters, digits, and _. Lines starting with '#' are comments.

Output Format. The output is a Vertex cover set, with one vertex per line if the given instance is an Yes instance , otherwise Output is No. **Example:**

```
l1
r2
mr
m1
```

Generate sample test cases for your implementations. You have to submit sample testcases(atleast 25 of sufficiently large size (varying from 100 to 2500 vertices)) along with the source code. Also submit a comparison table showing the running times of both algorithms(your implementation) with your sample test cases.

Each implementation should be accompanied by a short description of your brute force algorithm and fixed-parameter algorithm either in plain text format or as a pdf.

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