Competitive Programming SS24

Submit until end of contest

Problem: subgraph (1.0 second timelimit)

Note: This is a problem that is harder to solve than usual. Solve the other problems first before spending too much time on this one.

You are given a connected, undirected graph $G = (V, E)$, four vertices $s_1, t_1, s_2, t_2 \in V$ and two distances l_1, l_2. Find the minimal size of a set $E' \subseteq E$ such that in $G' = (V, E')$ the following distance relations hold[1]:

$$d_{G'}(s_1, t_1) \leq l_1$$
$$d_{G'}(s_2, t_2) \leq l_2$$

Input The first line of the input contains n and m ($1 \leq n \leq 2000$, $0 \leq m \leq \min\{\binom{n}{2}, 2000\}$), the number of nodes and edges. The next one contains six integers $s_1, t_1, l_1, s_2, t_2, l_2$ ($1 \leq s_1, t_1, s_2, t_2 \leq n$, $0 \leq l_1, l_2 \leq n$). The i-th of the next m lines contains u_i and v_i ($1 \leq u_i, v_i \leq n$), denoting an edge between the two nodes.

Output Output the minimal size of E'. If no valid E' exists, output -1.

Sample input

```
3 2
1 2 1 2 3 1
1 2
2 3
```

Sample output

```
2
```

Sample input

```
4 3
1 3 2 2 4 2
1 2
2 3
3 4
```

Sample output

```
3
```

Sample input

```
4 3
1 3 2 2 4 1
1 2
2 3
3 4
```

Sample output

```
-1
```

[1] $d_G(a, b)$ is the hop-distance between a and b in G. If a and b are not connected in G, then $d_G(a, b) = \infty$