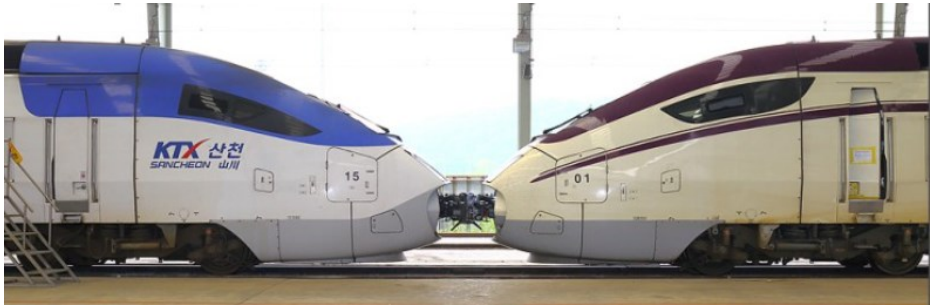
ECE30018 Problem Solving Studio, Fall 2023

C2. Two Trains

| Submission due: 3:00 PM, 15 Sep Fri

Two Trains



There are N cities identified by 1, 2, 3, ..., N, such that some of two cities are connected directly with railway.

Therea are two trains, Alpha and Beta: Alpha consumes p amount of fuel for moving between two connected cities, and Beta consumes q amount of fuel. We assume that the fuel consumption of a train is the same for transiting any two directly connected cities.

Interestingly, the two trains can be coupled together when they stay in the same city. The coupled trains move together while consuming only r amount of fuel per city-to-city transition for $r < p + q$. Here we assume that no fuel is taken at coupling the two trains.

Suppose that, initially Alpha is located at City 1 and heading to City N, and Beta is at City 2 and heading to City N as well.

Write a program that finds the minimum amount of fuel required for moving Alpha and Beta to City N. Note that the two trains may or may not be coupled at a city.

Requirements

Input. The input data is given to the standard input. The first line has five integers, $p, q, r, N,$ and M for each is no more than 40000. N indicates that there are N cities named as 1, 2, ..., N. The second to $(M + 1)$-th lines contain M pairs of two numbers each indicates two cities connected directly by railway.

Output. Print to the standard output, the minimum amount of the total fuel required for Alpha and Beta to reach City N. The time limit is 0.5 second.

Example

Input file

```
4 4 5 8 8
1 4
2 3
3 4
4 7
2 5
5 6
6 8
7 8
```

Output file

```
22
```

C2 Teams

Team No.	Members
201	박세찬, 백하현
202	오인혁, 전혜림
203	유건민, 이신원
204	강하림, 나보림,
205	최정겸, 최혜림
206	박민지, 이준명
207	이원빈, 최소미,
208	백건하, 소병찬