

1011 ×××××

Problem Description

××××× G $1, 2, 3, \dots, n$ m

$1, 2, 3, \dots, m$ i $1 \leq i \leq m$ $u_i \rightarrow v_i$

G^0 $1, 2$ $1 \rightarrow 2$ k $k \geq 1$

G^k G^{k-1} G

G^{k-1} G 1 G 2

k G^k

■ G^k G^{k-1} G^{k-1} G^k

■ G^{k-1}

■ G^k

G^{k-1} $u \rightarrow v$

■ G^k n G n m n

G $1, 2$ x, y

■ G^k u, v u, x v, y a, b

$b \rightarrow \gamma$ $a \rightarrow \gamma$ $\gamma \rightarrow b$ $\gamma \rightarrow a$

$a \rightarrow b$ $b \rightarrow a$

G k' $G^{k'}$ 1000000007

Input

××××××××××××

$$T \quad 1 \leq T \leq 100$$

$$m + 1$$

$$n, m, k' \quad 2 \leq n \leq 10^5 \quad 2 \leq \sum n \leq 3 \times 10^5 \quad 0 \leq m \leq \sum m \leq 10^6 \quad 0 \leq k' \leq 10^{18} \quad G$$

$$m \quad i + 1 \quad 1 \leq i \leq m \quad u_i, v_i \quad 1 \leq u_i, v_i \leq n \quad G$$

$$u_i \rightarrow v_i$$

Output

$$G^{k'}$$

1000000007

Sample Input

```
3
3 3 1919810
1 2
2 3
3 1
5 5 2
1 5
1 3
3 4
4 2
2 3
4 4 5
1 3
2 3
3 4
4 3
```

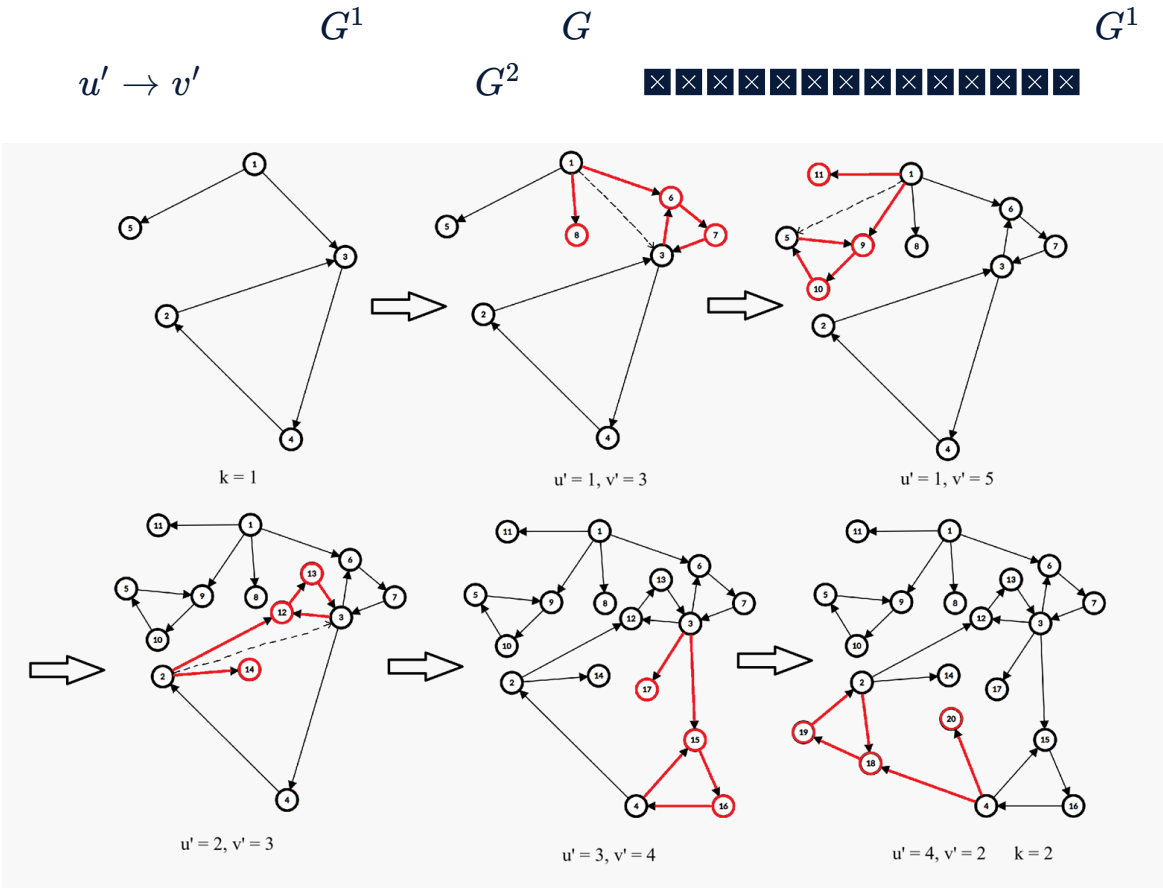
Sample Output

1

8

428

Hint



Input: Graph G , parameter k

Output: Graph G^k

```
1: _____Vertices in  $G$  are numbered from 1 to  $N$ .
2: function SOLVE(Graph  $G$ , parameter  $k$ )
3:   function TRANSFORM(Graph  $A$ , Graph  $G$ ) _____Replace all edges in  $A$  with graph  $G$ 
4:      $B \leftarrow (V(A), \emptyset)$ 
5:     function MERGE(Vertex  $x$ , Vertex  $y$ ) _____Merge vertices  $x$  and  $y$ . Note that multi-edges are allowed.
6:       for all  $y \rightarrow t$  in  $E(B)$  do
7:         Replace the edge  $y \rightarrow t$  with an edge  $x \rightarrow t$ 
8:       end for
9:       for all  $s \rightarrow y$  in  $E(B)$  do
10:        Replace the edge  $s \rightarrow y$  with an edge  $s \rightarrow x$ 
11:      end for
12:    end function
13:     $N \leftarrow |V(G)|$ 
14:     $M \leftarrow |E(G)|$ 
15:    for all  $u \rightarrow v$  in  $E(A)$  do _____Replace edge  $u \rightarrow v$  with graph  $G$ 
16:      Add  $N$  new vertices  $w_1, w_2, \dots, w_n$  to  $B$ 
17:      for all  $s \rightarrow t$  in  $E(G)$  do
18:        Add a new edge  $w_s \rightarrow w_t$  to  $B$ 
19:      end for
20:      MERGE( $u$ ,  $w_1$ )
21:      MERGE( $v$ ,  $w_2$ )
22:    end for
23:    return  $B$ 
24:  end function
25:   $V(H) \leftarrow \{1, 2\}$ ,  $E(H) \leftarrow \{1 \rightarrow 2\}$ 
26:   $H \leftarrow (V(H), E(H))$  _____Let  $H = G^0$ 
27:   $i \leftarrow 1$ 
28:  while  $i \leq k$  do
29:     $H \leftarrow \text{TRANSFORM}(H, G)$  _____ $H \leftarrow G^i$ 
30:     $i \leftarrow i + 1$ 
31:  end while
32:  return  $H$ 
33: end function
34: return SOLVE( $G, k$ )
```
