



## 4204 - Chemical Plant

Asia - Dhaka - 2008/2009

Dealing with chemicals is a risky job, particularly if it is reactive. Reactive chemicals can be dangerous if not stored in an appropriate environment. As a result, sophisticated instruments that can support real-time processing, is required while transferring a reactive chemical from one part of a chemical plant to another one. However, instruments that can ensure strictly real-time service, is too much costly & hence chemical plants use networks that provide real-time transfer with some tolerance.



Let us be a bit more elaborate. In our concerned chemical plant, there are  $V$  pits. Pits are places where chemicals can be stored. In order to reduce cost, they are not facilitated with reactive chemical handling environment. So, for every second the reactive chemical stays in some of these pits, they are decayed by 1 milligram. The pits are numbered from 1 to  $V$ . There is a safe storage attached to pit  $S$ . No time is required to move to the storage from pit  $S$ . There is some reactive chemical weighing  $W$  milligram in pit 1 at time 0. This chemical is to be transported to the safe storage. Note that, the safe storage door is opened exactly at time  $T$ . So, if the chemical reaches the storage before time  $T$ , you will have to accept decaying of the chemical whereas if it reaches after time  $T$ , it can not enter the safe storage. There are  $E$  transfer tubes in the network. The transfer tubes have suitable environment for storing reactive chemicals inside them. So, the chemicals are not decayed inside the tubes. Each transfer tube connects two pits with an entry point in pit  $s$  and an exit point in pit  $d$ . For each tube  $t$ , the entry point door is opened for any 1 second between time  $sst$  &  $sct$  ( $sst \leq sct$ ) but we don't exactly know in which second it is opened. Similarly, the exit point door is opened for any single second between time  $dst$  &  $dct$  ( $dst \leq dct$ ). As you don't know the exact timing of the

doors' opening, if we want to move the chemical from pit  $s$  to pit  $d$  using tube  $t$ , it must be available at pit  $s$  no later than time  $sst$ . If the chemical reaches a particular pit  $x$  using tube  $y$  with exit point range  $dsy$  &  $dcy$  ( $dsy \leq dcy$ ) & leaves this pit using tube  $z$  with entry point range  $ssz$  &  $scz$  ( $ssz \leq scz$ ), the maximum possible decay in that pit is  $scz - dsy$ . Please note that, while choosing the tube to get out from a pit, you must always select a tube with it's opening interval beginning no sooner than the latest possible time for the chemical to enter that pit. For instance, in the 3rd sample test case, the chemical will always leave pit 2 using the 3rd edge even if it reaches pit 2 at time 15.

Write a program to find a way to transfer the chemical from pit 1 to the safe storage with maximum guaranteed weight left (in milligram) in the storage i.e. with minimum guaranteed decay. Please note that, the chemical can not have negative weight at any point.

## Input

The input file contains multiple test cases. First line of each test case contains three integers,  $V$  ( $1 \leq V \leq 50,000$ ),  $E$  ( $1 \leq E \leq 100,000$ ) &  $W$  ( $1 \leq W \leq 2,000,000,000$ ). The next line has two integers,  $S$  ( $1 \leq S \leq V$ ) &  $T$  ( $0 \leq T \leq 2,000,000,000$ )

Each of the following  $E$  lines describes a tube. A Tube  $t$  is described with 6 integers,  $s$  ( $1 \leq s \leq V$ ),  $d$  ( $1 \leq d \leq V$ ),  $sst$ ,  $sct$ ,  $dst$ ,  $dct$  ( $0 \leq sst \leq sct < dst \leq dct \leq 2,000,000,000$ ) where  $s$ ,  $d$ ,  $sst$ ,  $sct$ ,  $dst$  &  $dct$  holds the meaning as in problem statement.

The end of input is denoted with a case where  $V = E = W = 0$ . This case should not be processed.

## Output

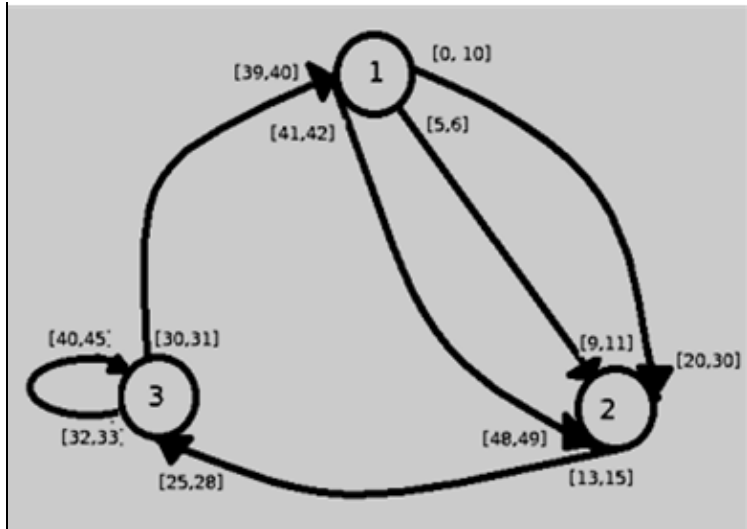
For each test case, print a single line of the form, Plant  $C$ :  $L$  where  $C$  is the test case number and  $L$  is the weight of the chemical available in the safe storage at time  $T$ .

## Sample Input

## Output for Sample Input

3 6 50	Plant 1: 27
2 50	Plant 2: 15
1 2 0 10 20 30	Plant 3: 30
1 2 5 6 9 11	1 <sup>st</sup> Sample Illustration:
2 3 13 15 25 28	
3 3 32 33 40 45	
3 1 30 31 39 40	
1 2 41 42 48 49	
5 13 20	
3 1000	
3 3 41 41 999 1000	
3 3 39 40 1000 1000	

5 4 25 25 30 30  
 1 2 2 2 6 6  
 1 2 1 1 8 8  
 2 2 7 7 13 13  
 2 2 8 8 15 15  
 2 3 14 14 20 20  
 2 3 16 16 20 20  
 4 3 30 30 40 40  
 4 3 32 32 41 41  
 3 5 21 21 25 25  
 3 5 22 22 25 25  
 3 3 50  
 3 30  
 1 2 5 10 15 25  
 2 3 20 20 30 30  
 2 3 25 25 30 30  
 0 0 0



The above diagram depicts the first case in sample. The chemical starts at time 0 in pit 1. Then goes to 2 by the ([5,6] [9,11]) edge. Minimum guaranteed decay at 1 is 6. Then 2 to 3 via the ([13,15] [25,28]) edge. Minimum guaranteed decay is 6. Then 3 to 1 through tube ([30,31] [39,40]). Again with 6 minimum guaranteed decay. Finally 1 to 2 by the ([41,42] [48,49]) edge. The minimum guaranteed decay is 3 at node 1 & 2 at the destination.

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