Whops!-settlement

Employees at the Department of Informatics have been to a department seminar where things have spiraled rather out of control with regards to employees lending small amounts of money to each other. Everyone is to settle their expenses by transferring money via the service Whops!. Unfortunately, due to a series of inter-departmental "misunderstandings", many employees have blocked each other on Whops!, making the settlement process difficult. The administration observes the situation with despair, noting that this problem will only continue in the coming years, due to the department's plan to expand dramatically. They have an existing process to determine how much each employee owes or is owed in total. Now, they are asking the students of IN2010 (who are at this point experts in algorithms and data structures) to come up with a general solution to check if a settlement may be realized using Whops! or not, that will scale with the departments planned expansion.

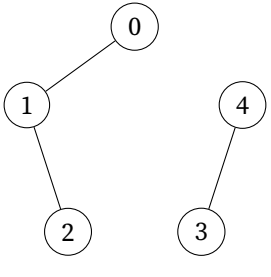
You get to work, formalizing the problem as a graph problem. You let $G = (V, E)$, where every employee is represented with a vertex $v \in V$, and let there be an (undirected) edge $\{u, v\} \in E$ between two employees if they have not blocked each other on Whops!. For each employee $v \in V$, you can lookup in a table `T`, where `T[v]` is an integer representing how much v owes or is owed in total. If `T[v]` is negative, then v owes money, but if `T[v]` is positive, then v is owed money. You know that the sum of all numbers in `T` is exactly 0. Note that this means that if everyone was able to exchange money between each other

using Whops! (possibly via other employees), a settlement could always be reached.

Provide an algorithm that takes G and T as input and return **`true`** if a settlement may be reached using Whops!, and **`false`** if this is not possible.

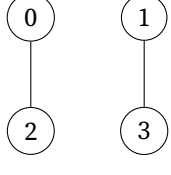
Here are two examples of how G and T may look. In the example of G_1 and T_1, a settlement is reachable through Whops!, but for the example of G_2 and T_2, it is not possible to reach a settlement through Whops!.

G_1



v	$\mathsf{T}_1[v]$
0	500
1	−200
2	−300
3	−50
4	50

G_2



v	$\mathsf{T}_2[v]$
0	300
1	−250
2	0
3	−50