Problem E: Escape

You hit the emperor lich with full force and slay it. There is a stair leading upwards here. You climb upstairs. You drink from the pool. You feel much better. The karmic lizard punches through your armor and hits you. You die...

After an epic fight with the emperor lich, the hero struggles to escape the dungeon consisting of n chambers and $n-1$ corridors connecting them. He starts in chamber number 1 and must reach chamber number t, moving only along the corridors. All chambers are reachable from chamber number 1. Bruised after the last fight, the hero starts the journey with 0 hit-points (HP). These points represent his health – if ever they fall below zero, the hero's story ends there as a tragic one.

In some chambers there are monsters – a monster must be fought, and it always manages to take some of the hero's HP. In some other chambers there are magic pools – every pool restores some number of the hit-points. There is no upper limit on the hero's health. Every chamber can be visited multiple times, but the gain or loss of HP happens only once, on the very first visit.

Determine whether the hero can escape the dungeon alive.

Input

The first line of input contains the number of test cases T. The descriptions of the test cases follow:

The first line of each test case contains two integers: the number of chambers n, $2 \leqslant n \leqslant 200\,000$, and the number of the exit chamber t, $2 \leqslant t \leqslant n$. The second line contains n space-separated integers between -10^6 and 10^6 – the i-th of them denotes the HP gain in the i-th chamber (negative denotes a monster, positive – a pool, and zero means that the chamber is empty). The first chamber does not contain a monster, but a pool is possible there. The exit chamber may contain a pool or a monster, and the monster will have to be fought before escaping.

The next $n-1$ lines contain the descriptions of corridors. Each one contains a pair of integers – the ends of a corridor.

Output

For each test case print a single line containing the word **escaped** if escape is possible, or **trapped** otherwise.

Example

For an example input	the correct answer is:
2 7 7 0 -3 2 2 3 -4 0 1 2 2 3 2 4 1 5 5 6 6 7 3 2 3 3 -4 1 3 2 3	escaped trapped