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SOI Day 2021

Johannes Kapfhammer

9 January 2021

First Round 2022

15 September – 30 November

First Round SOI 2021/2022

Dancing Mice

Mouse Stofl is organizing a stage dance for N mice. The N mice will stand in a circle, and then during the dance the mice that stand next to each other in the circle can form pairs. During each moment, one mouse can belong to at most one pair, but the pairs can change during the dance. For example, for $N = 5$ the mice can first form pairs as 0+1, 2 (dancing alone), 3+4, and then change to 1, 2, 3, 4+0 (remember that since they are standing in a circle mouse $N - 1$ can form a pair with mouse 0), and so on.

For each pair of adjacent mice i and $i + 1$ (or $N - 1$ and 0 for $i = N - 1$), Stofl has prepared a sequence of dance moves that they will perform as a pair, which lasts for t_i seconds. These moves do not have to be performed as one consecutive segment – for example, if $t_i = 5$, the pair can dance together for 1.5 seconds, then the two mice can form different pairs or dance alone for some time, and then they can form a pair again and dance for the remaining 3.5 seconds. It's OK to split this dancing time into more than two segments, too.

Now Stofl is wondering how to put all those moves together into one big dance for all mice. More specifically, you need to help Stofl design a dance with the shortest overall duration that allows mice i and $i + 1$ (or $N - 1$ and 0 for $i = N - 1$) to dance as a pair for at least t_i seconds for each i.

Input/Output

All subtasks have the same input and output format.

1		500	100	100	100	100	100
2		497	100	100	100	97	100
3		495	100	100	100	95	100
4		493	100	100	100	93	100
4		493	100	100	100	93	100
6		430	100	100	60	70	100
7		429	100	100	100	86	43
7		429	100	100	100	86	43
9		421	100	100	100	78	43
10		405	100	100	100	90	15
11		363	100	100	60	88	15
12		360	100	100	100	45	15

- First Round: 15 September–30 November, 2021
- SOI Day: 8 January, 2022
- SOI-Camp: 12 – 19 February 2022
- Second Round
  - **2T** **March 4–7:** Theoretical round from home (5h)
  - **2P** **March 10–14:** Practical tasks from home (5h)
  - **2H** **Dec 1–Mar 14:** Extra points for homework
- Swiss Finals: May
- IOI: 7–14 August

- Non-profit organization
- Funding from government, foundations and industry
- We're all volunteers, former participants and students
- Supported by the Science Olympiad, ETH Zürich, and other partners

- 12:45-13:15 Discussion of Tasks I
    - T-Shirts (Timon Gehr)
    - Ropeways (Jan Schär)
    - Dancing (Petr Mitrichev)
- 13:15-13:30 EGOI Review (Charlotte Knierim)
- 13:30-14:10 Talk: Computer Simulations for Science and Engineering (Patrick Jenny)
- 14:10-14:55 Foto session and short break