if we consider the implied graph where two buttons i and j are connected if they control the same light, then based on the value x_i for one button we can propagate and calculate the values within the entire connected component of that button.

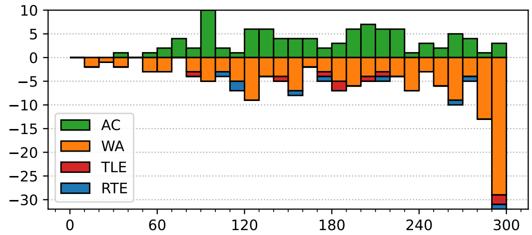
This leads to the following linear-time algorithm: for each connected component of the graph, pick an arbitrary button i, try all 3 possible values $x_i = 0, 1, 2$, and propagate the result. If an inconsistency is found (some equation is not satisfied), then this value of x_i is invalid. Otherwise, check the total number of button presses (sum of x_i's in the component). If all 3 possible choices of x_i are invalid then there is no solution, otherwise pick the one that leads to the smallest number of button presses within this component.

In the problem there could also be some lights that were controlled by a single button, leading to an equation of the form $c_\ell + x_i = 0 \pmod 3$ which immediately determines x_i. One could special-case the handling of these and propagate their values first, but it is probably less error-prone to simply include them in the inconsistency check in the above algorithm instead.

Problem H: Jet Lag

Problem authors:
Jakub Onufry Wojtaszczyk and Federico Glaudo

Solved by 96 teams.
First solved after 33 minutes.
Shortest team solution: 669 bytes.
Shortest judge solution: 246 bytes.



This problem, which has absolutely no real-world inspirations, can be solved with a greedy approach with a short implementation.

One method to solve this problem is to first ignore the restriction that you cannot sleep while rested. This allows you to sleep during some intervals $[e_i, b_{i+1}]$, where $e_0 = 0$. After sleeping during one such interval, we can be awake until $e_i + 2(b_{i+1} - e_i)$, so we greedily sleep during these intervals if they allow us to stay up later than we currently can.

After having a list of sleeping intervals from the above process, we need to modify them such that the beginning of one sleep interval is not in the k minutes after the end of the previous one. To do so, say two consecutive sleep intervals are $[s_i, t_i]$ and $[s_{i+1}, t_{i+1}]$. Then we need

$$s_{i+1} \geq t_i + (t_i - s_i) = 2t_i - s \qquad \Leftrightarrow \qquad \frac{s_{i+1} + s_i}{2} \geq t_i$$

Thus we set t_i to the mean of s_i and s_{i+1} if needed.

Problem I: Waterworld

Problem authors:
Walter Guttmann and Yujie An

Solved by 110 teams.
First solved after 16 minutes.
Shortest team solution: 171 bytes.
Shortest judge solution: 90 bytes.