1 Lonely Runner Conjecture

Given a unit length circulr track and k runners that are travelling at a pairwise distinct speed. Call a runner *lonely* if they are at least $1/k$ units from every other runner at some time t. The Lonely Runner Conjecture states that every runner is lonely at some time.

2 $p^\alpha q^\beta$

Fix two primes, p and q, and take $\alpha, \beta \in \mathbb{N}$. Given a number of the form $p^\alpha q^\beta$ find the next number of the same form in polynomial time.

A generalisation of this problem. Fix primes p_i, and take $\alpha_i \in \mathbb{N}$ where i ranges from 1 to n in both cases. Given a number of the form

$$\prod_{i=1}^{n} p_i^{\alpha_i}$$

find the next number of the same form in polynomial time.