SIMULATED ANNEALING: The Big Picture

goal: minimize a function $f: \Omega \to \mathbb{R}$

- start at a random point $x \in \Omega$ (x is a "state")
- repeatedly choose a new point/state
  - If new point is more optimal, then move there.
  - Otherwise, move to the new point with some probability that decreases over time

IDEA: explore the domain Ω and gravitate toward an optimal location

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New Problem: Find the maximum product of ten numbers whose sum is 100.

Maximize: $f: \Omega \to \mathbb{R}$

→ where Ω consists of all selections of ten nonnegative integers whose sum is 100

$x \in \Omega$ is a ten-tuple $(n_0, n_1, n_2, \ldots, n_9)$

such that $n_0 + n_1 + n_2 + \cdots + n_9 = 100$

→ $f(n_0, n_1, \ldots, n_9) = n_0 \cdot n_1 \cdot n_2 \cdots n_9$

→ Transitions: $x = (n_0, n_1, n_2, n_3, n_4, n_5, n_6, n_7, n_8, n_9)$

pick two of the ten numbers at random. increment one, and decrement the other

e.g. $y = (n_0, n_1, n_2+1, n_3, n_4, n_5-1, n_6, n_7, n_8, n_9)$