

Problem: Infinite Grid

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June 2025

Prelude

Infinite systems are intimidating, often rendering our usual methods of solving problems useless. However, in special situations, their infinitude also gives rise to new symmetries, allowing novel ways of tackling the problem. This is the case in this problem, where the goal is to find the equivalent resistance of an infinite grid of resistors.

Problem

Consider an infinite 2D grid with resistors of resistance R placed on every edge:

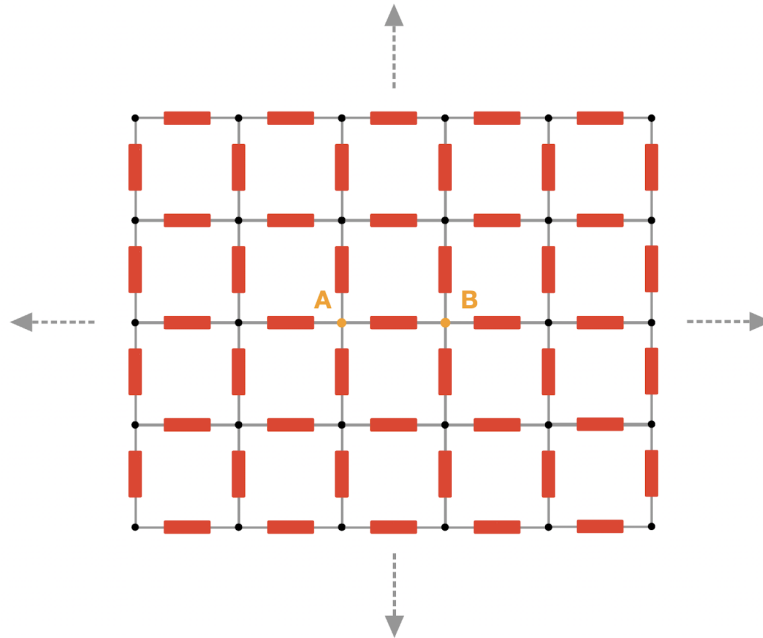


Figure 1: Arrangement for this problem

What is the equivalent resistance between two adjacent vertices A and B ?

Tip: Use the superposition principle!