# Physics Cup 2018 - Problem 1. January 7, 2018

Consider infinite lattice of resistors as shown in the figure. Each blue piece of wire between neighbouring nodes has resistance $R_b = 1\,\Omega$, and each red piece of wire between neighbouring nodes has resistance $R_r = 2018\,\Omega$. (Nodes are marked as black circles.) Let the resistance between the nodes A and B (marked in cyan) be ρ. Find such r and R that

$$r \leq \rho \leq R \quad \text{and} \quad R/r \leq 2.$$

(You need to prove that for the values of r and R suggested by you, these inequalities hold.)
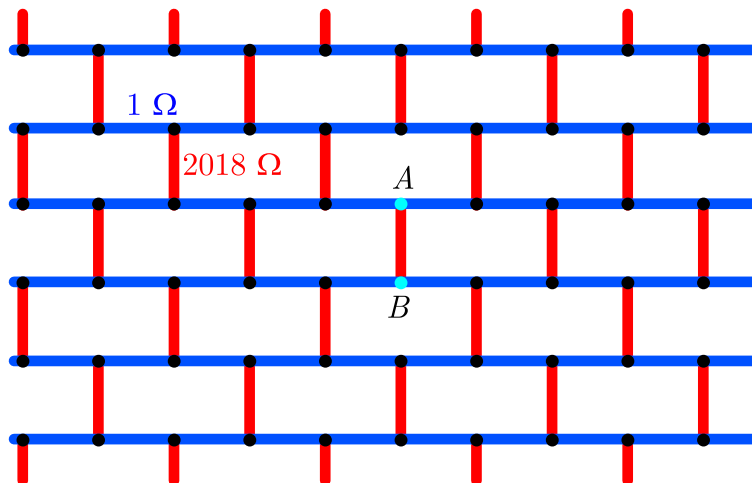
Hint (January 7, 2018): Both the lower and upper bound for the resistance can be found by applying idea 27 from the electrical circuits booklet.

   Remark: if you are unable to download the booklet, please let me know (together with the reason why you aren't able to download); I'll send it by e-mail.

Correct solutions submitted during the first week:

name	school	country	pr1 solved
Siddharth Tiwary	Lakshmipat Singhania Academy	India	01 Jan 03:50
Navneel Singhal	ALLEN Kota	India	01 Jan 05:52
Satoshi Yoshida	The University of Tokyo	Japan	01 Jan 13:35
Konstantine Gagnidze	Komarovi N199	Georgia	02 Jan 11:25
Prathyush Poduval	Canara PU College	India	02 Jan 16:45
Dylan Toh	NUS High School	Singapore	02 Jan 18:40
Tóbiás Marozsák	Óbudai Árpád Gimnázium	Hungary	03 Jan 18:41