MCMT Homework 13

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Exercise 13.1

Exercise 12.2.

Exercise 13.2

Let θ be unit current.
Before gluing: $R(a,z) = \inf_\theta E(\theta)$, s.t. $\sum_y \theta(v_1, y) = 0, \sum_y \theta(v_2, y) = 0$.
After gluing: $R'(a,z) = \inf_\theta E(\theta)$, s.t. $\sum_y \theta(v_1, y) + \sum_y \theta(v_2, y) = 0$.
They have the same objective function, but $R'(a,z)$ has a relaxed constraint.
So $R(a,z) \geq R'(a,z)$.

Assume there is an edge between v_1 and v_2 with $r = \inf$. After gluing, the resistance is 0, and $\phi(v_1) = \phi(v_2)$. Corollary 13.4, the new resistance is smaller as ϕ has changed.