Assignment 11 - due October 20th

Send pdf with answers to dcc030ufmg@gmail.com. They must be typed up in latex.

This assignment is about Chapter 15 of the book Graph Spectra and Quantum Walks, and also introduces Chapter 13.

1st part

- Read Sections 15.2 to 15.5, and 15.7. Also, read the complementary material https://homepages.dcc.ufmg.br/~gabriel/QIT/wp-content/uploads/2020/08/primitivity.pdf
- Read 13.1 to 13.5 (don't worry about Lemma 13.2.3). Write-up a short summary highlighting the properties satisfied by the average mixing matrix (non-negative, positive iff connected, positive-semidefinite, rational, doubly-stochastic).

2nd part

Exercise 1. Using Exercise 2 from previous week's assignment and making reference to the characterization of imprimitive DRG's, write a proof that if perfect state transfer happens in a distance-regular graph, then the graph must be antipodal, and its antipodal classes have size 2.

In addition, characterize all strongly regular graphs (DRGs of diameter 2) that admit perfect state transfer.

Exercise 2 (Open problem :)**.** Show that the average mixing matrix of a primitive distance-regular graph is full-ranked, or find a counter-example.