PageRank as a discrete Green's function

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Abstract: Originally, PageRank was a way to assign quantitative ranking to webpages by Web search engines. In general, PageRank can be viewed as a measure of relative "importance" defined on any given graph. In this paper, we examine properties of PageRank and further establish the relationship of PageRank with a family of discrete Green's functions. Through this connection, we investigate the relationship of the PageRank of an induced subgraph and that of the whole graph. We also examine the hitting time of a modified random walk and its connection with PageRank via Green's functions.