

## ORE'S THEOREM, LABELLED GRAPHS, FACEBOOK

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### ABSTRACT

*In continuation of our work on the application of graph theory and in particular labeled graph theory to SNS, we examine in this paper the applications of Ore's theorem to SNS. Ore's theorem gives a sufficient condition for the existence of a closed Hamiltonian Path and application of Ore's theorem to Facebook requires some new definitions of two labeled degree of a vertex and labeled Hamiltonian paths. In this paper, each definition is examined for its application to SNS. Under these definitions, Ore's theorem and its converse is verified in Facebook. Though in general converse of Ore's theorem is not valid, we demonstrate how it works in SNS with some altered conditions. We also show that a closed Hamiltonian path in Facebook exists for any two nonadjacent vertices without depending on the condition of Ore's theorem. Hamiltonian paths by definition result in a one way communication paths in Facebook between two non adjacent vertices, this becomes a two way communication path, thanks to Ore's theorem which guarantees a closed Hamiltonian path.*

**KEYWORDS:** Directed Hamiltonian Path, Hamiltonian Path, Hamiltonian Cycle, Hamiltonian Graph Labeled Degree of a Vertex, Path

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### Article History

**Received: 06 Jan 2018 / Revised: 23 Jan 2018 / Accepted: 05 Feb 2018**

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