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1. Proposal (min. 100 words)

Graph theory in Optimizing Public Transportation Networks

This will explore how graph theory (a fundamental topic in discrete math) is applied to optimmize public transportation networks, particularly in urban transit systems. The focus will be on how concepts such as vertices, edges, shotest paths, spanning trees, and network flow can model real-world transit routes to improve efficiency, reduce congestion, and increase reliability. The project will demonstrate how algorithms are used for path optimization in systems like Toronto's TTC or GO Transit. It will also examine how these mathematical models contribute to cost-effective planning, improved scheduling, and better service coverage across growing transportation systems.

2. History of your proposed idea (min. 100 words)

The use of graph theory in transportation dates abc to the early 20th century, when it was first applied to map railways and optimize delivery routes. With the growth of urban populations and increasing demand on transit systems, graph theory became essential in modeling and improving infrastructure. Algorithms developed in the mid 1900s transformed the way shortest paths were calculated. Today, companies like google maps, uber, and municipal transit authorities use advanced graph theory models to analyze real-time data and generate efficient routing. Graph theory has evolved from a purely theoretical field to a critical tool in transportation logistics and urban planning.

3. What do you hope to achieve at the end of your project? (min 50 words)

I aim to demonstrate s strong understanding of graphb theory and its algorithms, and how these mathematical principles translate into practical solutions for real-world transportation challenges. I also hope to build skills in applying abstract concepts to real syustems and clearly presenting them through bothy written and video formats.