Graph Theory 1, MATH 5340, Fall 2024

Homework 9, 3.1. Walks and Connection

Due Saturday, November 9, at 11:59 p.m.

Write in complete sentences!!! *Explain* what you are doing and convince me that you understand what you are doing and why. Justify all steps by quoting relevant results from the textbook, class notes, or hypotheses. Do not discuss homework problems with others. If you have any questions, then contact me (gardnerr@etsu.edu). Use the same notation and terminology we used in class and given in the in-class hints.

3.1.1. If there is an xy-walk in a graph G, prove that there is also an xy-path in G.

3.1.2. Let G be a graph with vertex set V and adjacency matrix $\mathbf{A} = (a_{uv})$. Prove that the number of uv-walks of length k in G is the (u, v) entry of $\mathbf{A}^k$.

3.1.5. Prove that in any graph G, the distance function satisfies the *triangle inequality* for any three vertices x, y, and z, $d(x, z) \leq d(x, y) + d(y, z)$.