Graph Theory 1, MATH 5340, Fall 2020

Homework 1, 1.1. Graphs and Their Representations

Due Friday, August 28, at 1:30

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 copy the work of others; **do your own work!!!**

1.1.1. Let G be a simple graph. Prove that $m \leq \binom{n}{2}$, and determine when equality holds. Use the incidence function ψ_G and its properties in your proof.

1.1.2. Let $G[X, Y]$ be a simple bipartite graph, where $|X| = r$ and $|Y| = s$.

(a) Prove that $m \leq rs$. Use the incidence function ψ_G and its properties in your proof.

(b) Prove that $m \leq n^2/4$.

(c) Describe the simple bipartite graph G for which equality holds in (b).

1.1.3. Prove the following.

(a) Every path is bipartite.