**Homework Chapter 10**

**CMSC 207 Chapter 10 “Graphs and Trees” Proof Questions**

**#1.**

Prove that having *n* vertices, where *n* is a positive integer, is an invariant for **graph isomorphism**.

Isomorphism is an equivalence relation with two graphs. Two graphs with equal vertices and edges. Graph A with a positive number of vertices and edges - let’s say 20 for both. To fulfil graph isomorphism then Graph B needs the same number of edges and vertices as graph A. If isomorphism has no change, then it follows the invariant property.

**#2.**

Prove that the sum of the degrees of the vertices of any finite graph is even.



Graph G has a positive number of V vertices and G is connected. If V >= 2 then, total degree of the vertices will be even. Four figures above are example proving this theorem.

**#3.**

Show that every simple finite graph has two vertices of the same degree.

Graph has V number of vertices continuing 1, 2, …, n-1. This criterion means that all vertices are connected to one another. So, at most a vertex has n-1 degrees, then a vertex does have the same degree.