Exam 4 Topics

Vertex Degree Sum Formula: The sum of the vertex degrees is twice the number of edges.

Graph Isomorphism: Two graphs are isomorphic if and only if there is a one-to-one correspondence between the vertex sets that preserves edge connections. In other words, one graph can be superimposed on the other.

Chromatic Number: $\chi(G)$ = minimum number of colors needed to properly color the vertex set of G (no edge has same color endpoints).

Chromatic Polynomial: $P_G(k)$ = number of ways to properly color the vertex set of G using k colors. There is a recurrence relation for $P_G(k)$ which is useful for computing it.

Planarity: Kuratowski's Theorem, the circle-chord method for detecting non-planarity, Euler's Formula, inequalities based on Euler's Formula and girth of a graph and dot-counting.

Connectivity: $\kappa(G)$ = minimum number of vertices whose removal from G leaves disconnected (or single vertex) graph. $\lambda(G)$ = minimum number of edges whose removal from G leaves disconnected (or single vertex) graph. There is an inequality relating these two parameters to each other and to the minimum vertex degree.

Blocks: The edge set of any graph can be partitioned into blocks (maximal subgraphs with vertex connectivity ≥ 2). Find the blocks in a graph.

Graph Fundamentals: In addition to the terms above, know the definition and basic properties of walks, paths, cycles, trees, closed and open Euler trails, Hamilton cycles, bipartite graphs, complete graphs.