

m38s11 Midterm 1

Omissions:

incidence matrices
Matrix Tree Theorem
graceful labeling
Harary graphs
blocks
proof of Kuratowski's Theorem
proof of Ramsey's Theorem

Topics:

- subgraphs, induced graphs
- paths, cycles, walks, trails, closure
- decomposition, complement, isomorphism, self-complement
- bigraphs
- Eulerian (di)graphs
- adjacency matrices: powers and paths; for digraphs
- (minimum/maximum/in-/out-)degree, regularity, neighborhood; orientation, underlying graph
- (strongly/weakly) connected, (strong) component, triviality; k -connectivity and k -edge connectivity for (di)graphs; cut-edge, disconnecting set, edge cut; cut-vertex, separating set, vertex cut; internally disjoint paths, (closed) ear decomposition
- (in-/out-)trees, (minimum) spanning trees, shortest path tree; Prüfer code, contraction/deletion
- (perfect/maximal/maximum) matching, saturation, Hall's condition; vertex cover, independent set, edge cover
- Euler's formula for planar graphs, Kuratowski's Theorem
- pigeonhole principle, Ramsey's Theorem for sets and graphs
- vertex coloring, greedy algorithm, Welsh-Powell Prop., Brook's Theorem
- Hamiltonian cycles and paths, and necessary and sufficient conditions for Hamiltonian cycles to exist
- probability space, independent events, pigeonhole property of expectation, linearity of expectation, indicator variable, and their applications to graph theory