Note: the distribution of these problems may not match the distribution of exam topics.

Problem §9.5 - 36(a,b): What is the congruence class $[4]_m$ when m is

(a) 2?

(b) 3?

Problem §10.2 - 5: Can a simple graph exist with 15 vertices each of degree five?

Problem §10.3 - 35,37-39,41-44: Determine whether the given pair of graphs is isomorphic (see Rosen for the graphs). Exhibit an isomorphism or provide a rigorous argument that none exists.

Problem §10.4 - 11a: Determine whether this graphs is strongly connected (see Rosen for the graphs) and if not, whether it is weakly connected.

Problem §10.4 - 37: Show that a simple graph with at least two vertices has at least two vertices that are not cut vertices.

Problem §10.5 - 10: Can someone cross all the bridges shown in this map (see Rosen) exactly once and return to the starting point?

Problem §10.5 - 36: Determine whether the given graph (see Rosen) has a Hamilton circuit.

Problem §10.6.18: Is a shortest path between two vertices in a weighted graph unique if the weights of edges are distinct?

Problem §10.7.15: If a connected planar simple graph has e edges and v vertices with $v \geq 3$ and no circuits of length three, prove that $e \leq 2v - 4$.

Problem §11.1.3 a-e: Answer these questions about the rooted tree illustrated (see Rosen!)

(a) Which vertex is the root?

(b) Which vertices are internal?

(c) Which vertices are leaves?

(d) Which vertices are children of j?

(e) Which vertex is the parent of h?

Problem §11.2.1: Build a binary search tree for the words banana, peach, apple, pear, coconut, mango, and papaya using alphabetical order.