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

Problem §9.1 - 42: List the 16 different relations on the set $A = \{0, 1\}$.

Problem §9.1 - 44(a,c,d,f): Which of the 16 relations on $A = \{0, 1\}$, which you listed in Exercise 42, are reflexive? Symmetric? Antisymmetric? Transitive?

Problem §9.3 - 6: How can the matrix representing a relation R on a set A be used to determine whether the relation is asymmetric?

Problem §9.3 - 13: Let R be the relation represented by the matrix

$$M_R = \begin{bmatrix} 0 & 1 & 1 \\ 1 & 1 & 0 \\ 1 & 0 & 1 \end{bmatrix}.$$

Find the matrices representing $R^{-1}, \overline{R}, R \circ R$.

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.