Instructions

Below are the practice exam problems which you must turn in when you come in to take the exam; these must be written up neatly or typed on separate paper and in accordance with the guidelines in your syllabus. Your grade will be based on you completing all the questions and on the quality of your work. In addition there is a long list of practice problems from the text which you do not need to turn in but are representative of the sorts of questions which may be on the exam.

Use the graphs in figure 1 when answering questions about specific graphs.

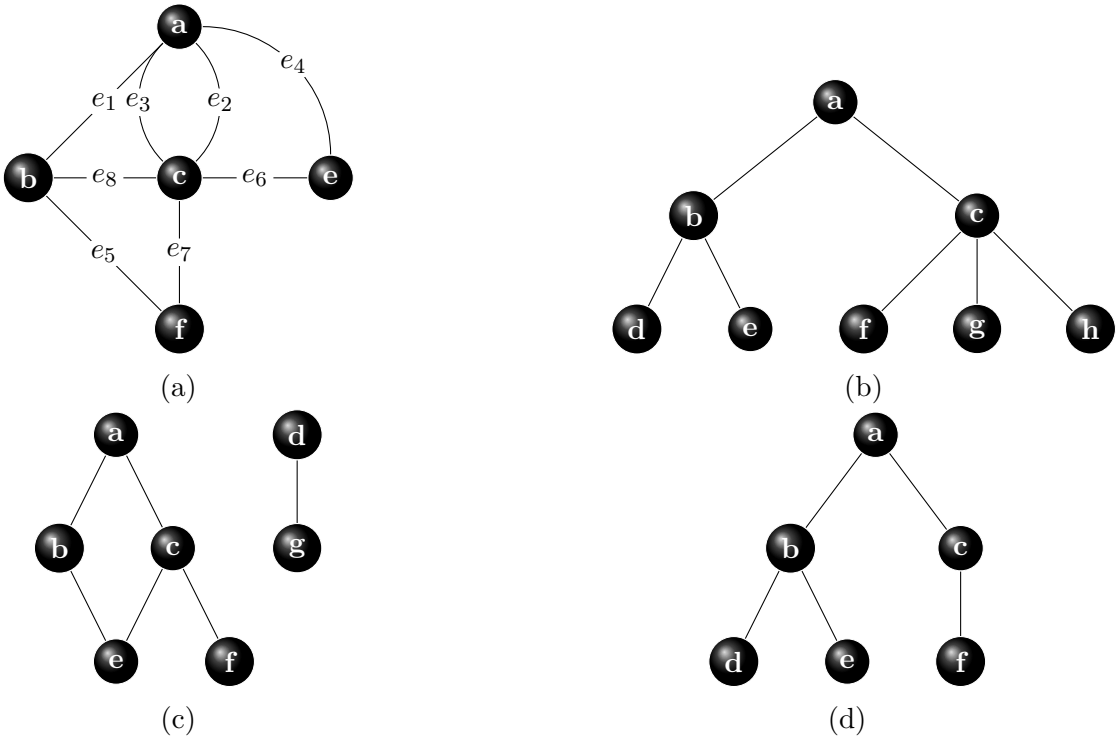

Figure 1: Reference Graphs

Practice Exam Problems:

1. Looking at graph 1a, identify which of the following is a *path*, *closed walk*, *trail*, and *circuit*. (Use the most accurate label.)

   (a) $a - e_1 - b - e_5 - f - e_7 - c - e_3 - a$

   (b) $a - e_1 - b - e_5 - f - e_7 - c - e_6 - e$

   (c) $a - e_2 - c - e_6 - e - e_4 - a - e_3 - c$

   (d) $a - e_1 - b - e_5 - f - e_7 - c - e_8 - b - e_1 - a$

2. Looking at graph 1a, how many paths are there from vertex b to vertex c?

3. A ***bridge*** is an edge whose removal disconnects a graph. Are there any bridges in graph 1a? What about graph 1c? Justify your answers.

4. Does the graph 1c have an *Euler Circuit*? Justify your answer.
5. Describe a *Hamilton Circuit* in graph 1a.
6. Write the *adjacency matrix* for graph 1d.
7. Sketch a graph with *adjacency matrix*

$$\begin{bmatrix} 1 & 0 & 1 \\ 0 & 1 & 2 \\ 1 & 2 & 0 \end{bmatrix}$$

8. Find the matrix product

$$\begin{bmatrix} 3 & 0 \\ 1 & -2 \end{bmatrix} \begin{bmatrix} 1 & 2 & 3 \\ -1 & 0 & 2 \end{bmatrix}$$

9. Which graph(s) in figure 1 are *trees*? Explain your conclusion.
10. Which graph(s) in figure 1 are *binary trees*? Explain your conclusion.
11. Can you draw a *connected graph* with 9 edges and 9 vertices? If so, sketch it. If not, why?
12. Can you draw a *tree* with 9 edges and 9 vertices? If so, sketch it. If not, why?

Additional Practice Problems:

(listed by section and problem number)

§ 10.1: 1,4,6a,8a,9a,12,14,19,29;
§ 10.2: 2a,3a,4ac,5a,9ad,20;
§ 10.4: 7a,8,9,10,11,12,13