Instructions: All assignments are due by **midnight** on the due date specified.

Every student must write up their own solutions in their own manner.

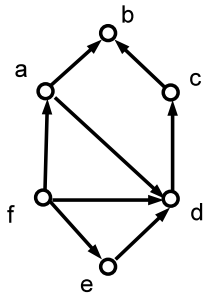
Please present your solutions in a clean, understandable manner. Use the provided files that give mathematical notation in Word, Open Office, Google Docs, and LaTeX. Do Not Crowd Your Answers!

Assignments should be typed and submitted as a PDF.

You should complete all problems, but only a subset will be graded (which will be graded is not known to you ahead of time).

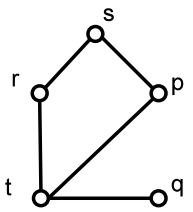
Graphs

1. (2 points) Rosen Ch 10.2 # 54, p. 667.
2. (3 points) Rosen Ch 10.3 #36, p. 676.
3. (3 points) Rosen Ch 10.3 #38, p. 676.



Graph 1

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



Graph 3

4. (10 points) Consider Graphs 1-3 above. Determine the adjacency list for Graph 1. Draw the graph represented by the adjacency matrix for Graph 2 (label the nodes: v, w, x, y, z). Determine the adjacency matrix for Graph 3.
5. (9 points) Rosen Ch 10.3 #54, p. 677.
6. (3 points) Rosen Ch 10.3 #68(a), p. 678.
7. (6 points) Rosen Ch 10.4 # 2a,b,c, p. 689.
8. (6 points) Rosen Ch 10.4 # 12, p. 690.
9. (6 points) Rosen Ch 10.4 # 14(a,b), p. 690
10. (4 points) Determine the cut vertices and edges for the graphs of Rosen Ch 10.4, Exercise 31 & 32, p. 691.
11. (14 points) For each graph, determine whether it has an Euler circuit and an Euler path. If a circuit or path exists, construct an example.
    (a) Rosen Ch 10.1, Exercise 4, p.650
    (b) Rosen Ch 10.2, Exercise 22, p. 665
    (c) Rosen Ch 10.2, Exercise 23, p. 666

(d) Rosen Ch 10.2, Exercise 24, p. 666
For the directed graphs, read the conditions expressed in Rosen Ch 10.5, #16-17.
(e) Rosen Ch 10.1, Exercise 7, p. 650
(f) Rosen Ch 10.5, Exercise 18, p. 704
(g) Rosen Ch 10.5, Exercise 20, p. 704

Present answers as table:

	Euler Circuit?	Euler Path?	Example Circuit	Example Path
(a)	Yes/No	Yes/No	a, b, c, ...	—
(b)				

12. (6 points) Rosen Ch 10.5, # 26(a,b,c), p. 705.

13. (10 points) For each graph, determine whether it has a Hamilton circuit and a Hamilton path. If a circuit or path exists, construct an example.

(a) Rosen Ch 10.3, Figure 1, p. 668
(b) Rosen Ch 10.3, Figure 10, graph H, p. 673
(c) Rosen Ch 10.4, Exercise 33, p. 691
(d) Rosen, Ch 10.4, Exercise 14(b), p. 690
(e) Rosen, Ch 10.5, Exercise 6, p. 704

Present results in a table like Problem 11.

14. (6 points) Determine whether each graph is planar, if it is give a planar representation.

(a) Rosen Ch 10.7, Exercise 2, p. 725
(b) Rosen Ch 10.7, Exercise 6, p. 725
(c) Rosen Ch 10.7, Exercise 8, p. 725

15. (6 points) For each graph, determine the chromatic number.

(a) Rosen Ch 10.2, Exercise 24, p. 666
(b) Rosen Ch 10.3, Exercise 2, p. 675
(c) Rosen Ch 10.7, Exercise 24, p. 726

Bonus

16. (1 point (bonus)) Rosen Ch 10.3 # 44, p. 676

17. (1 point (bonus)) Rosen Ch 10.5, # 28(a), p. 705.

18. (3 points (bonus)) The **complementary graph** G is describe in Rosen Ch 10.2, # 59, p. 667. A graph G is called **self-complementary** if it is isomorphic to G.

(a) Give an example of a self-complementary graph with $|V| = 4$.
(b) Give an example of a self-complementary graph with $|V| = 5$.

19. (10 points (bonus)) Consider the set of all non-isomorphic simple undirected graphs (but do allow self-loops) of 3 vertices.

(a) Draw all such graphs.
(b) How many are connected?
(c) How many are bipartite?
(d) How many have a Euler circuit?
(e) How many have a Hamiltonian circuit?
(f) How many have a Euler path?
(g) How many have a Hamiltonian path?
(h) How many are planar?