

MAT385 Test 2: Chapters 5, 6, and 7.2

Name:

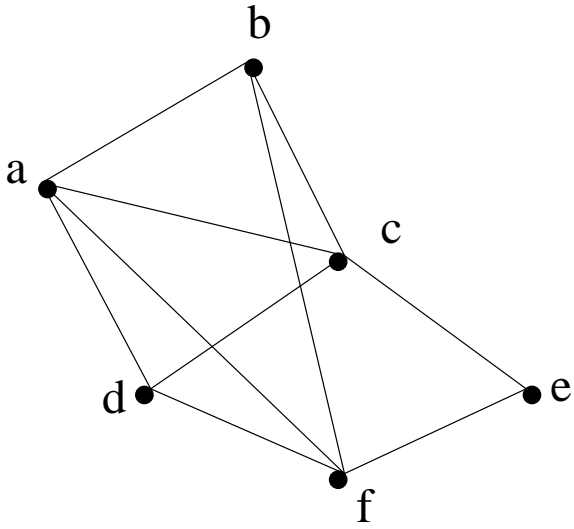
Directions:

- All problems are equally weighted.
- Show your work! Answers without justification will likely result in few points. Your written work also allows me the option of giving you partial credit in the event of an incorrect final answer (but good reasoning).
- Indicate clearly your answer to each problem (e.g., put a box around it).
- **Good luck!**

Problem 1. Consider the list (f,o,e,n,u,c,r,t,g,m,p).

1. Create a binary search tree from the list (entered in list order).
2. Do a pre-order traversal of the tree.
3. Do an in-order traversal of the tree.
4. Do a post-order traversal of the tree.

Problem 2. Consider the graph below:



1. Produce an adjacency matrix which represents the graph.
2. Determine whether an Euler path exists. If so, indicate how to trace it.
3. Does a Hamiltonian circuit exist using the nodes a-c-d in that order? If so, indicate how to trace it.

Problem 3. Given the following truth function:

x_1	x_2	x_3	$f(x_1, x_2, x_3)$
1	1	1	1
1	1	0	1
1	0	1	0
1	0	0	0
0	1	1	1
0	1	0	0
0	0	1	0
0	0	0	0

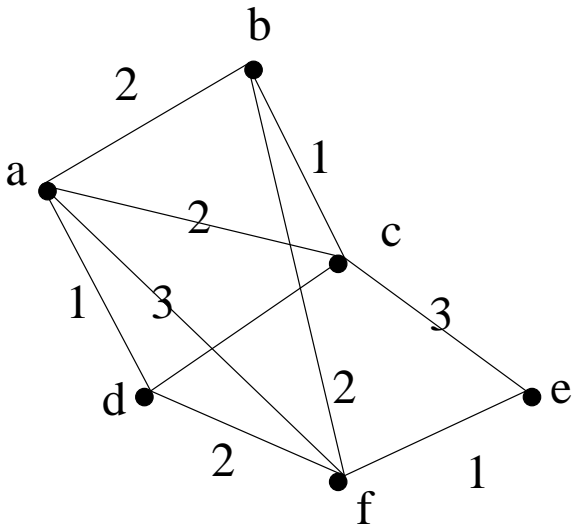
1. Find the canonical sum of products representation for this truth table (3 pts).
2. Use Boolean algebra to reduce the canonical representation (4 pts).
3. Draw a logic network equivalent to the reduced expression in part 2 (3 pts).

Problem 4. Given the adjacency matrix of graph G below:

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

1. Draw the graph, using node names a, b, c, d, e, and f. (4 points)
2. Is G simple?
3. Is G connected?
4. Is G complete?
5. Is G planer?
6. Does G have any cycles?
7. What is the degree of each node?

Problem 5. Use Dijkstra's algorithm to find the shortest path between nodes a and e in the following graph. Please show your steps: simply drawing the shortest path will not garner you many points!



Problem 6.

Problem 7. True or False?

1.

2.

3.

4.