LARSON—MATH 356—HOMEWORK 09
Test 3 Review.

You should know the following definitions, theorems, algorithms, and proofs for the test. Write out careful definitions, theorem statements, algorithms, proofs, and solutions. Turn these in at test time.

**Notation & Concepts**

Give a definition for each of the following concepts and an example illustrating the concept.

1. level sets
2. eccentricity
3. radius
4. center
5. diameter
6. radius critical graph

**Theorems**

State each of the following theorems.

7. Kruskal’s Algorithm Theorem.
8. Dijkstra’s Algorithm Theorem.
9. Tree Center Theorem.

**Proofs**

10. Prove the Kruskal’s Algorithm Theorem.
11. Prove the Tree Center Theorem.
Algorithms

12. State and explain Kruskal’s Algorithm.

13. Apply the Dijkstra’s Algorithm pseudo-code to find a tree of minimum distances from a vertex to each of the others.

Problems

14. Use Kruskal’s algorithm to find a minimum weight spanning tree of a weighted graph.

15. Use Dijkstra’s algorithm to find a minimum shortest path in a weighted or unweighted graph (Petersen Graph).

16. Explain how to use Dijkstra’s algorithm to find the level sets of a vertex.

17. Explain how to use Dijkstra’s algorithm to find the radius of a connected graph.

18. Explain how to use Dijkstra’s algorithm to find the diameter of a connected graph.

19. Give an example of a radius critical graph and explain why it is radius critical.

20. Find a formula for the radius of the cycle graphs \(C_n\). Explain.

21. Find a formula for the diameter of the cycle graphs \(C_n\). Explain.

22. Find a formula for the radius of the star graphs \(S_n\). Explain.

23. Find a formula for the diameter of the star graphs \(S_n\). Explain.

24. Find the radius and diameter of this graph. Explain.

25. Is this graph radius critical? Explain.