**General:**

* Before beginning this homework, be sure to read the textbook sections and the material in Learning Module 7.
* Type your solutions into this document and be sure to show all steps for arriving at your solution. Just giving a final number may not receive full credit.
* You may copy and paste mathematical symbols from the statements of the questions into your solution. This document was created using the Arial Unicode font.
* These homework problems are proprietary to SNHU COCE. They may not be posted on any non-SNHU web site.
* The Institutional Release Statement in the course shell gives details about SNHU’s use of systems that compare student submissions to a database of online, SNHU, and other universities’ documents.

Refer to Figure HW 7 for problems 1 – 5.

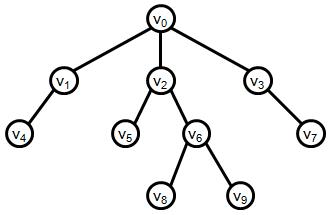


Figure HW 7

1. List all of the following.
   1. Level-2 vertices
   2. Leaves
   3. Siblings of v2
   4. Descendants of v2

This problem is similar to Exercises 9 and 10 in Section 7.1 of your SNHU MAT230 textbook

2. Is this an n-tree? If so, for what integer n?

This problem is similar to Exercise13 in Section 7.1 of your SNHU MAT230 textbook.

Yes, this is an incomplete 3-tree.

1. Explain how many vertices would need to be added to each existing vertex to create a complete 3-tree. For example, writing “v0: 2” would mean that two vertices need to be added to the existing v0 vertex. Writing “v0: 0” would mean that no vertices need to be added to the existing v0 vertex.

This problem is similar to Exercise18 in Section 7.1 of your SNHU MAT230 textbook

v0: 0 v1: 2 v2: 1 v3: 2 v4: 0

v5: 0 v6: 1 v7: 0 v8: 0 v9: 0

1. Compute the tree T(v2). You may use (copy / paste / move / resize / etc.) the images below to create your graph.

This problem is similar to Example 3 and to Exercises 11 and 16 in Section 7.1 of your SNHU MAT230 textbook.

1. Give the height of each tree. Explain your answers.
   1. T(v0).
   2. T(v2)

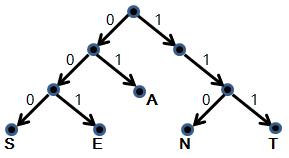
This problem is similar to Exercises 12 and 17 in Section 7.1 of your SNHU MAT230 textbook.

1. 3, because there are 3 edges until one reaches the bottom of the tree.
2. 2, because there are 2 edges until one reaches the bottom of the tree.
3. Construct the tree of the algebraic expression below. Note that problems 9 – 11 will refer to the tree that you construct in this problem. You may use (copy / paste / move / resize / etc.) the images below to create your graph.

This problem is similar to Figures 6 and 7 and to Exercises 1 – 10 in Section 7.2 of your SNHU MAT230 textbook.

((z + 3) ÷ (2 + y)) × (w – (z + 7))

Use the Huffman code tree below for problems 7 and 8.



1. Decode the message 110001000111. Show your calculations.

This problem is similar to Example 3 and to Exercise 25 in Section 7.2 of your SNHU MAT230 textbook.

110: N

001: E

000: S

111: T

Nest

1. Find the string that represents EAST. Show your calculations.

This problem is similar to Example 3 and to Exercise 26 in Section 7.2 of your SNHU MAT230 textbook.

001: E

01: A

000: S

111: T

00101000111

1. Use the tree that you constructed in problem 6 above. Show the result of performing a preorder search for ((z + 3) ÷ (2 + y)) × (w – (z + 7)). Explain your answer.

This problem is similar to Examples 1 and 2 and to Exercises 1 – 5 in Section 7.3 of your SNHU MAT230 textbook.

This is accomplished because a preorder search is done with the algorithm “Node, left, right”. So starting with the node of the tree, that will be listed first, and then the vertex to the left of that. One would keep moving left until they can no further and then move right. Continue this same pattern for each vertex.

1. Use the tree that you constructed in problem 6 above. Show the result of performing an inorder search for ((z + 3) ÷ (2 + y)) × (w – (z + 7)). Explain your answer.

This problem is similar to Examples 3 and 4 and to Exercises 6 – 9 in Section 7.3 of your SNHU MAT230 textbook.

This is accomplished because an inorder search is performed using a “left, node, right” algorithm. In this case, we moved as far left in the tree as possible then moved to the node, then the right. After this, we moved up one vertex to move right, but since we meet another tree, we move as far left as possible again and perform the same algorithm. Finally move to the initial node and move to the right following the same algorithm as on the left.

1. Use the tree that you constructed in problem 6 above. Show the result of performing an postorder search for ((z + 3) ÷ (2 + y)) × (w – (z + 7)). Explain your answer.

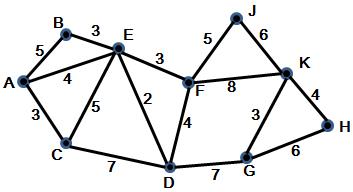
This problem is similar to Examples 3 and 4 and to Exercises 6 – 9 in Section 7.3 of your SNHU MAT230 textbook.

This is accomplished because a post-order search is done with the algorithm “left, right, node”. So with our tree we start all the way at the left vertex. We then move to the right vertex, and then the node. When we move up from there, since we are met with a node, we must move right. Since we are met with a tree, we move left. Then right. Then node. Finally, we can list our node we passed up earlier. Now we move to the right of our original node vertex and follow the same algorithm. Lastly, we list our original node.

1. Draw the digraph of the binary positional tree that corresponds to Figure HW 7 (which was used in problems 1 – 5 above, at the top of page 2). You may use (copy / paste / move / resize / etc.) the images below to create your graph.

This problem is similar to Examples 5 and 6 and to Exercises 31 and 32 in Section 7.3 of your SNHU MAT230 textbook.

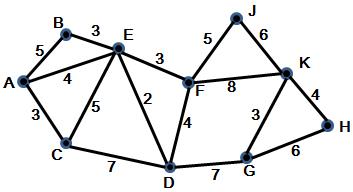
1. Use vertex A as the initial vertex and use Prim’s algorithm to find a minimal spanning tree. What is the total weight of your tree? You do not need to draw the tree, but do list the edges (as an ordered pair) in the order in which they are chosen.



This problem is similar to Example 6 and to Exercises 1 – 6 in Section 7.5 of your SNHU MAT230 textbook.

Total weight: 33

1. Use Kruskal’s algorithm to find a minimal spanning tree. What is the total weight of your tree? You do not need to draw the tree, but do list the edges (as an ordered pair) in the order in which they are chosen. This is the same graphs as in problem 13.



This problem is similar to Examples 8 and 9 and to Exercises 10 – 12 in Section 7.5 of your SNHU MAT230 textbook.

Total weight: 33