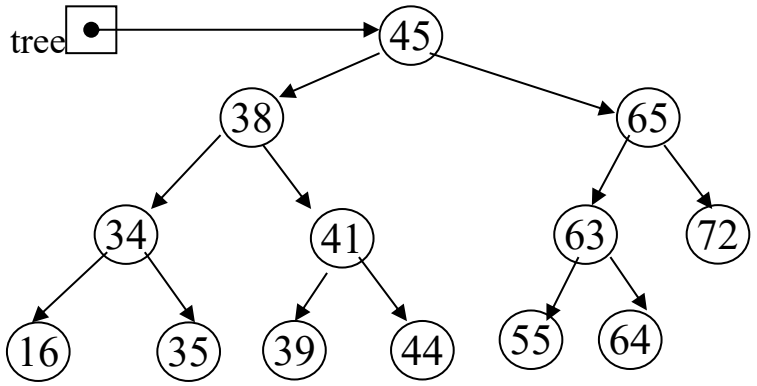
Trees Lab

- Complete this assignment using Microsoft Word, Excel, PPT, or your tool of choice
- **No coding is required**
- Submit your work and complete a small write-up highlighting your learning experience

1. Given the following binary tree:



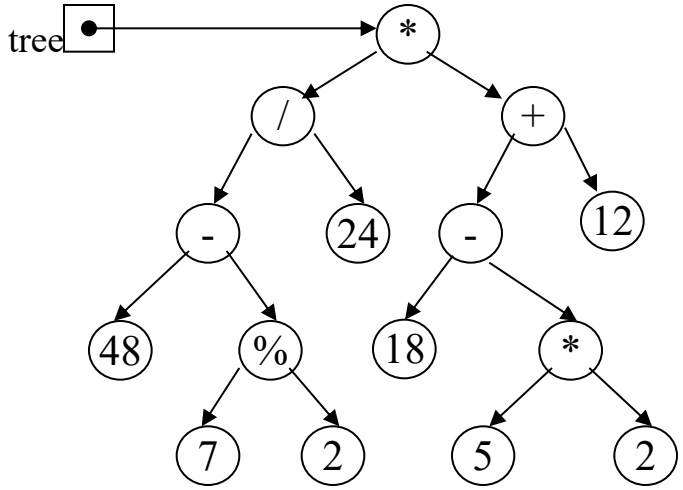
(a) What is the inorder traversal of the tree?
16 34 35 38 39 41 44 45 55 63 64 65 72

(b) What is the preorder traversal of the tree?
45 38 34 16 35 41 39 44 65 63 55 64 72

(c) What is the postorder traversal of the tree?
16 35 34 39 44 41 38 55 64 63 72 65 45

(d) What is the height of the tree? What nodes are on level 2?
4 **38 65**

2. Given the following binary expression tree:



(a) What is the inorder traversal of the tree?

((48 – (7 % 2)) / 24) * ((18 – (5 * 2)) +12)

(b) What is the postorder traversal of the tree?

48 7 2 % - 24 / 18 5 2 * - 12 + *

(c) What does it evaluate to if using integer division?

7 %2 = 1
((48−1)//24)×((18−(5×2))+12)
(47//24)×((18−10)+12)
(47//24)×(8+12)
(47//24)×20
47//24=1
1×20 = **20**

(d) What does it evaluate to if using float division?

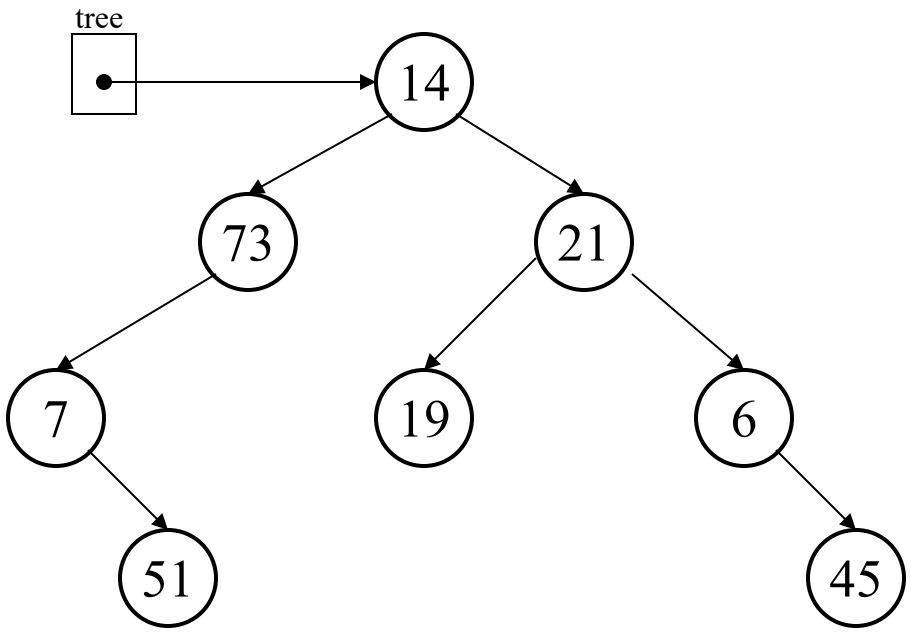
7 % 2= 1
((48−1)/24)×((18−(5×2))+12)
(47/24)×((18−10)+12)
(47/24)×(8+12)
(47/24)×20
47×20= 2447×20=24940 ≈ **39.1667**

3. The elements in a binary tree are to be stored in an array. Each element is a nonnegative int value.

a. What value can you use as a dummy value, if the binary tree is not complete? **-1**

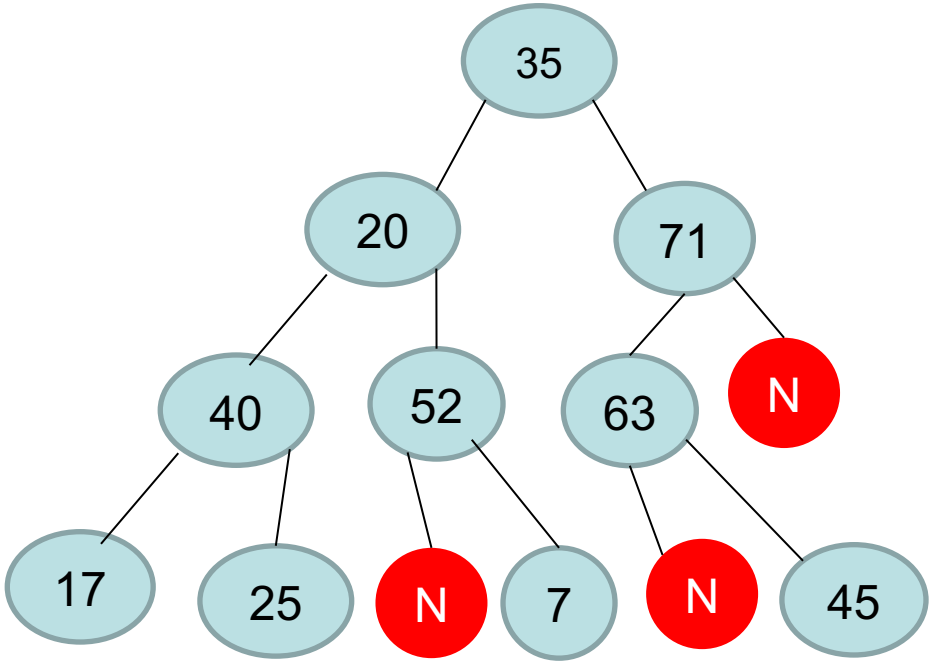
b. Show the contents of the array, given the tree illustrated below

[0]	14
[1]	73
[2]	21
[3]	7
[4]	-1
[5]	19
[6]	6
[7]	-1
[8]	51
[9]	-1
[10]	-1
[11]	-1
[12]	-1
[13]	-1
[14]	45



4. Given the array pictured below, draw the binary tree that can be created from its elements.

[0]	35
[1]	20
[2]	71
[3]	40
[4]	52
[5]	63
[6]	null
[7]	17
[8]	25
[9]	null
[10]	7
[11]	null
[12]	45



Write Up

In this lab, I worked on storing elements of a binary tree in an array. I also learned about three types of tree traversal techniques: inorder, preorder, and postorder.

I absolutely loved this lab. It was great practice, and the directions were straightforward. However, I did face some challenges, particularly with grasping the differences between the traversal techniques. At first, I mixed up the steps for each method. I solved this by creating detailed notes and flowcharts for each traversal type, which helped me remember the correct order. One thing I would do differently in the future is to review these notes regularly to reinforce my understanding.

Overall, the video lectures helped a tremendous amount, providing clear explanations and examples that made the concepts easy to grasp.