

On binary trees

You need to be alert to (usually minor) changes that may be made to the assignment statement or to the guidelines after the assignment is first put up. Refresh this frame and re-read the assignment carefully before you make your final submission.

Assignment statements

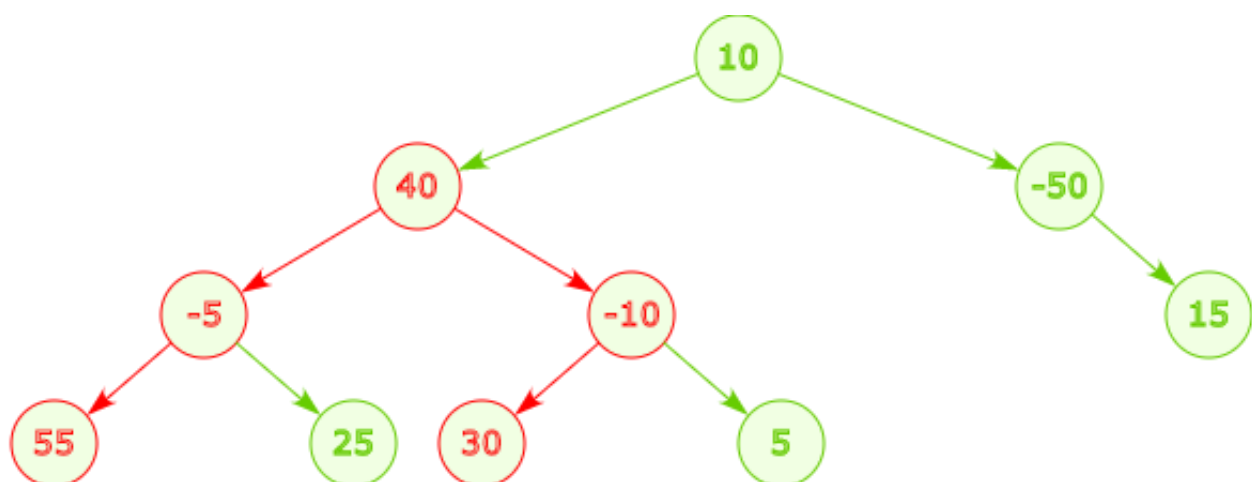
1. Generate a binary tree of 100 nodes containing *distinct* integer (both +ve and -ve) keys at random.

Be careful that the tree does not become degenerate. To generate a binary tree of n nodes, first create a root node and then you could recursively generate a left subtree of $m = \lceil pn \rceil$ nodes, where p is a random number between 0.4 and 0.6 and then the right subtree should be recursively created to have $n - m - 1$ nodes. Note that p should be randomly generated for each subtree.

2. Given a binary tree, carry out an inorder traversal of the tree and output the keys separated by a blank and terminated by double LF.
3. Given a binary tree, carry out an preorder traversal of the tree and output the keys separated by a blank and terminated by double LF.
4. Given a binary tree, carry out an postorder traversal of the tree and output the keys separated by a blank and terminated by double LF.
5. Given a binary tree storing integer keys, find the path from the root to a leaf node that has the maximum sum, output the keys separated by a blank and terminated by double LF.
6. Given a binary tree storing integer keys, find the path (between any pair of nodes) in it that has the maximum sum, output the keys separated by a blank and terminated by double LF.

The above should be coded as separate functions and called from the `main()` function. The tree generated in the first step should be used for the subsequent steps.

Example of a binary tree with the maximum sum path highlighted



Submissibles

1. C-program file.

NB: Assignment evaluation will be automatic, so do ensure that the output formatting specifications are strictly followed.

Do not output anything apart from what you have been asked to output, as that will confuse the automatic evaluation mechanism and as a result you will end up getting lower marks.

2. A report (plain text / latex) outlining the formulation of the mechanism to achieve the last two parts.

A [sample tex file](#) is also made available. That should be compiled with the command `pdflatex rep.tex` or just `pdflatex rep`

You can also work on this file using visual latex packages are available on both linux and windows.

Marking Guidelines

Assignment marking is to be done only **after** the deadline expires, as submissions gets blocked after the assignment is marked.

Random binary tree generation	5
The tree traversals	3×3=9
Max sum path to leaf	6
Max sum path	10
Report	5
<i>Total Marks</i>	35

Assignment submission

You need to submit a program file for the assignment and the report and also enhanced/optimised versions of routines (individual submission).

Use electronic submission via the [WBCM link](#)

You should keep submitting your incomplete assignment from time to time after making some progress, as you can submit any number of times before the deadline expires.

Warning

Cases of copying will be dealt with seriously and severely, with recommendation to the Dean to de-register the student from the course.