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Exercises Computational Physics

4 Binary Trees

1. Download the programm `tree_fragment3.c` from StudIp.

2. Invent a recursive formula for the number of leaves of a tree. (0.5 P)

   Implement the function as

```
/******************** count_leaves() ****************/
/** Calculates number of leaves recursively.         **/
/** PARAMETERS: (*)= return-paramter                 **/
/**         tree: pointer to root of tree            **/
/** RETURNS:                                         **/
/**   number of leaves                               **/
/*****************************************************/
int count_leaves(node_t *tree)
```

   and execute the function using the main function. (3 P)

   How do you have (in principle) to modify the function to calculate the number of nodes? (0.5 P)

3. Implement the function

```
/******************* remove_value() *****************/
/** Removes node containung the 'value' from  the    **/
/** tree.                                            **/
/** PARAMETERS: (*)= return-paramter                 **/
/**         tree: pointer to root of tree            **/
/**         value: to be removed                     **/
/**    (*) node_p: address of ptr to removed node    **/
/** RETURNS:                                         **/
/** (new) pointer to the root                        **/
/*****************************************************/
node_t *remove_value(node_t *tree, int value, node_t **node_p)
```

   Test this dunctionen extensively using the debugger, for different cases. Present to the examiner in particular: removal of nodes with 0, 1, or 2 successors. (6 P)