Telephones
This year's big task is to implement operations on telephone numbers. For the purpose of this task, we assume that a phone number is a non-empty string consisting of the digits 0, 1, 2, 3, 4, 5, 6, 7, 8, 9.

Part 1 of the task
As the first part of the task, implement a phone number forwarding operation module. A description of the module's interface can be found in the phone_forward.h file in the comments format for the doxygen program. An example of its use can be found in the file phone_forward_example.c.

Part 2 of the task
We modify the definition of a phone number. A phone number is still a non-empty string whose elements are digits, but now two additional digits are allowed. We represent the digit ten as the * character and the digit eleven as the # character.

Implement the phfwdReverse function according to the specifications given in the solution template provided with the first part of the task.

Part 3 of the task
Unfortunately, the phfwdReverse function does not determine the counterimage of the phfwdGet function. If phfwdGet(x) = y, then x belongs to the result of phfwdReverse(y). The implication in the other direction does not occur. The function must be implemented

PhoneNumbers * phfwdGetReverse(PhoneForward const *pf, char const *num);
which, for the forwarding base given by pointer pf and given phone number num, determines a lexicographically sorted list of all such phone numbers and only such phone numbers x that phfwdGet(x) = num. This function allocates the PhoneNumbers structure, which must be released using the phnumDelete function. The result of the function is NULL when it has failed to allocate memory. If the given num does not represent a number, the result is an empty string.

The response to a parameter with the value NULL should be standardised as follows. The result of the phfwdAdd function is false when the parameter pf has a NULL value. The functions phfwdDelete, phfwdRemove do nothing when the parameter pf has a NULL value. The result of the functions phfwdGet, phfwdGetReverse, phfwdReverse is NULL when the parameter pf is NULL. The phnumDelete function does nothing when the pnum parameter is NULL. The result of the phnumGet function is NULL when the pnum parameter is NULL.