1. Build a binary trie. Insert the following keys, one after another, into an originally empty trie:

 01010011, 00000111, 00100001, 01010001, 11101100, 00100001, 10010101, 01001010.

2. Draw a particular example of a binary trie. The trie contains 6 keys, each consists of 5 bits. There are two mandatory keys in the trie: 00000 a 11111. The depth of the trie is minimum possible.

3. A binary trie contains 1 000 000 strings, each string consists of 50 ASCII characters. What is the minimum and maximum amount of memory needed to store this trie?

4. In given binary trie T, we want to substitute each key by its bit complement (e.g. 10110 --> 01001).

Suggest and describe an effective method which will do the task. The method should not build a new trie and it should not destroy T.

5. We want to insert into binary trie T a sequence of keys k1, k2, ..., kN. We know that none of the keys k1, k2, ..., kN is in T. We also know that each of the keys k2, k3, ..., kN is bigger by one than the previous key (e.g. 0110, 0111, 1000, 1001, 1010, ... ).

Is there a way to add the keys into T which is faster than just mechanically adding one key after another by standard Insert operation?

6. There are two binary tries T1 and T2, no key value is stored simultaneously in T1 and T2.

Suggest and describe a method Merge(T1, T2) which merges the contents of T1 and T2 into a single trie without deleting any existing node and without creating any new node.

Write a pseudocode of the method.

7. Write a pseudocode of operation Delete in a binary trie.

Solve analogous problems for Patricia trie:

8. Build a Patricia trie. Insert the following keys, one after another, into an originally empty trie:

 01010011, 00000111, 00100001, 01010001, 11101100, 00100001, 10010101, 01001010.

9. Draw a particular example of a Patricia trie. The trie contains 6 keys, each consists of 5 bits. There are two mandatory keys in the trie: 00000 a 11111. The depth of the trie is minimum possible.

10. A Patricia trie contains 1 000 000 strings, each string consists of 50 ASCII characters. What is the minimum and maximum amount of memory needed to store this trie?

11. In given Patricia trie T, we want to substitute each key by its bit complement (e.g. 10110 --> 01001). Suggest and describe an effective method which will do the task. The method should not build a new trie and it should not destroy T.

12. We want to insert into Patricia trie T a sequence of keys k1, k2, ..., kN. We know that none of the keys k1, k2, ..., kN is in T. We also know that each of the keys k2, k3, ..., kN is bigger by one than the previous key (e.g. 0110, 0111, 1000, 1001, 1010, ... ).

Is there a way to add the keys into T which is faster than just mechanically adding one key after another by standard Insert operation?

13. There are two Patricia tries T1 and T2, no key value is stored simultaneously in T1 and T2.

Suggest and describe a method Merge(T1, T2) which merges the contents of T1 and T2 into a single trie without deleting any existing node and without creating any new node.

Write a pseudocode of the method.

14. Write a pseudocode of operation Delete in a Patricia trie.