COMP1927 15s2 Final Exam

[Instructions] [C language] [Algorithms]
[Q1] [Q2] [Q3] [Q4] **[Q5]** [Q6] [Q7] [Q8] [Q9]

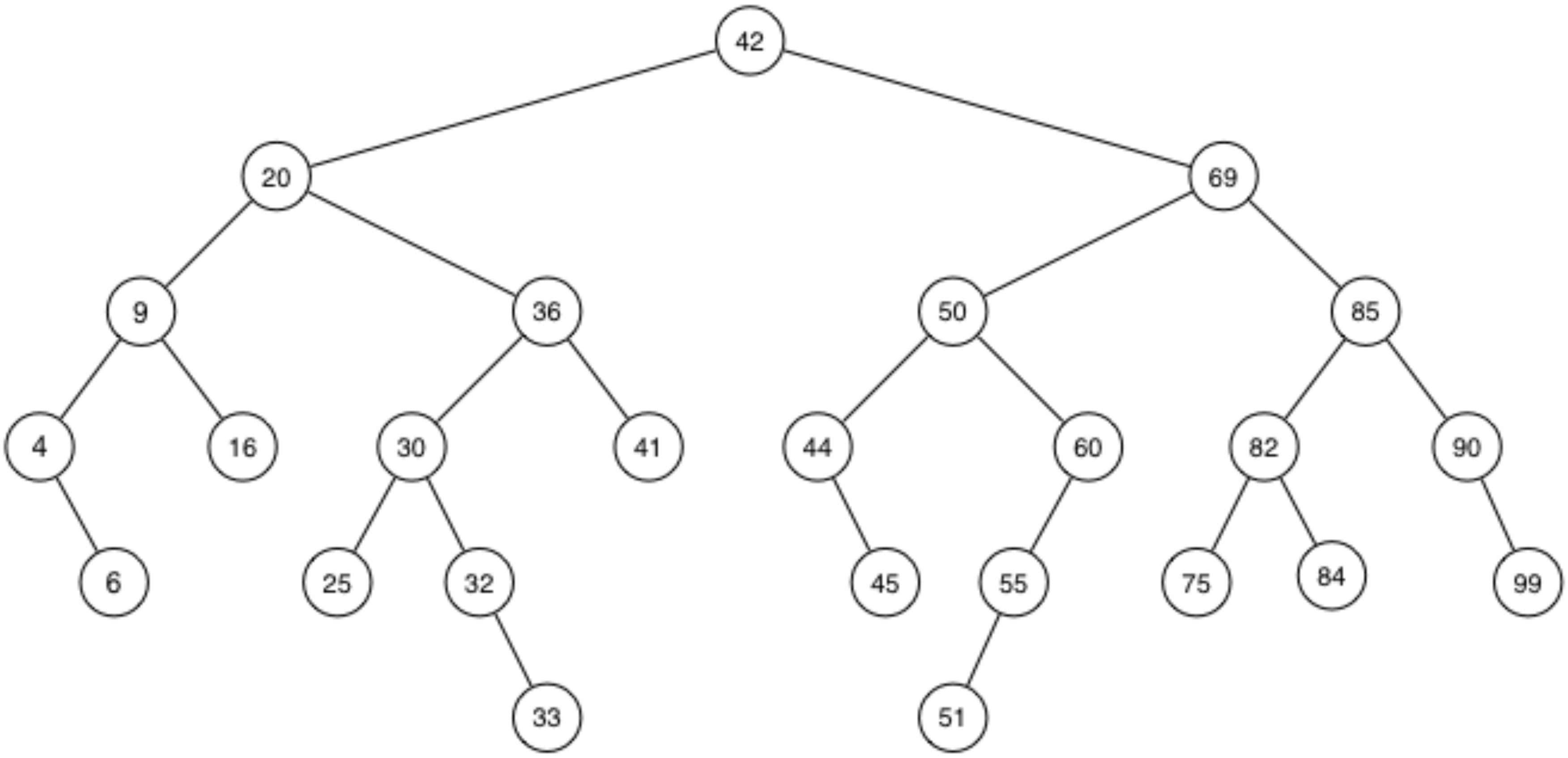
Question 5 (6 marks)

Consider the following definitions:

```
typedef struct Node *Link;
typedef struct Node { int key; Link L; Link R } Node;
typedef Link Tree;

int search(Tree t, int k)
{
   if (t == NULL)          return 0;
   else if (k < t->key)    return search(t->L, k);
   else if (k > t->key)    return search(t->R, k);
   else /*(k == t->key)*/ return 1;
}
```

and the following binary search tree:



Based on the above answer the following questions:

A. How many *key comparisons* will be performed while searching for the key 60 in the tree?

B. What is the minimum number of key comparisons that would be required for a successful search in this tree? What search key would cause this?

C. What is the maximum number of key comparisons that would be required in a successful search in this tree? What search key(s) would cause this?

D. What is the minimum number of key comparisons that would be required in an unsuccessful search in this tree? What search key(s) would cause this?

E. If the root node (42) were deleted, which value could replace it with minimal disruption to the structure of the tree?

F. If a right rotation were performed at the root of the original tree (i.e. on the node containing 42), what would be the new value in the root node, the new value in its left child, and the new value in its right child?

Type the answer to this question into the file called `q5.txt` and submit it using the command:

```
submit q5
```