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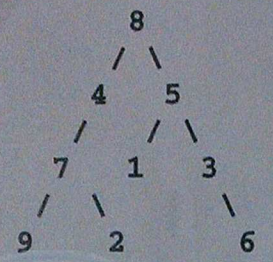
CSL201 Data Structures Minor 1 30th Aug, 2013

Name _____ Entry Number _____ Gp No._____

Your Lab day_____ Your TA _____

Answer all the questions in the space provided for each question. You may use the answer script for rough work.

1. **[2]** Write the preorder traversal of the following tree:



8 – 4 – 7 – 9 – 2 – 5 – 1 – 3 – 6

2

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2. [9] Complete the following function which accepts a sorted linked list in ascending order, with each node containing an integer, and returns the list after removing all nodes which appear more than once. Thus given the input

34– 40 – 55 – 55 – 62 – 78 , it should return 34– 40 – 62 – 78

5

```
node * duplicate( node *A) {
```

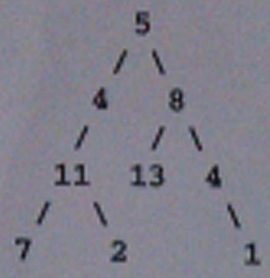
part 1

```
node * p = A;
if (p==NULL)
  { cout << "\n Empty list.";
    return;}
while (p->next !=NULL && A->next !=NULL)
  {
    while ((A->data)==(A->next->data))
    {
      node * h = A;
      int word1 = A->data;
      A = A->next;
      delete (h);
      if (A==NULL) break;
    }
  if (A->data == word1)
    {
      node * h = A;
      A = A->next;
      delete(h);
    if (A==NULL) return;
```

part 2

```
p=A;
if (p->next==NULL) break;
while(p->data==p->next->data)
{
  node * h = p;
  int word2 = p->data;
  p = p->next;
  delete(h);
  if (p==NULL) break;
}
if (p->data==word2)
{
  node * h = p;
  p = p->next;
  delete(h);
if (p==NULL) return;
```

3. [10] Given a tree and an integer, write a function which returns true if there is a path from the root down to a leaf, such that product of all the values along the path equals the given integer, otherwise return false. For example given the tree



Root-to-leaf paths for the above tree :

```
path 1: 5 4 11 7
path 2: 5 4 11 2
path 3: 5 8 13
path 4: 5 8 4 1
```

For this problem, we will be concerned with the product of the values of such a path -- for example, the product of the values on the 5-4-11-7 path is 5 * 4 * 11 * 7 = 1540.

bool funct (node* p, int n) {

if p->data does not divides n then return false;

else return funct (p->left, n/p->data)

|| funct (p->right, n/p->data).

}

no checking of whether root is null or not.
no terminating cond^n

no correct logic

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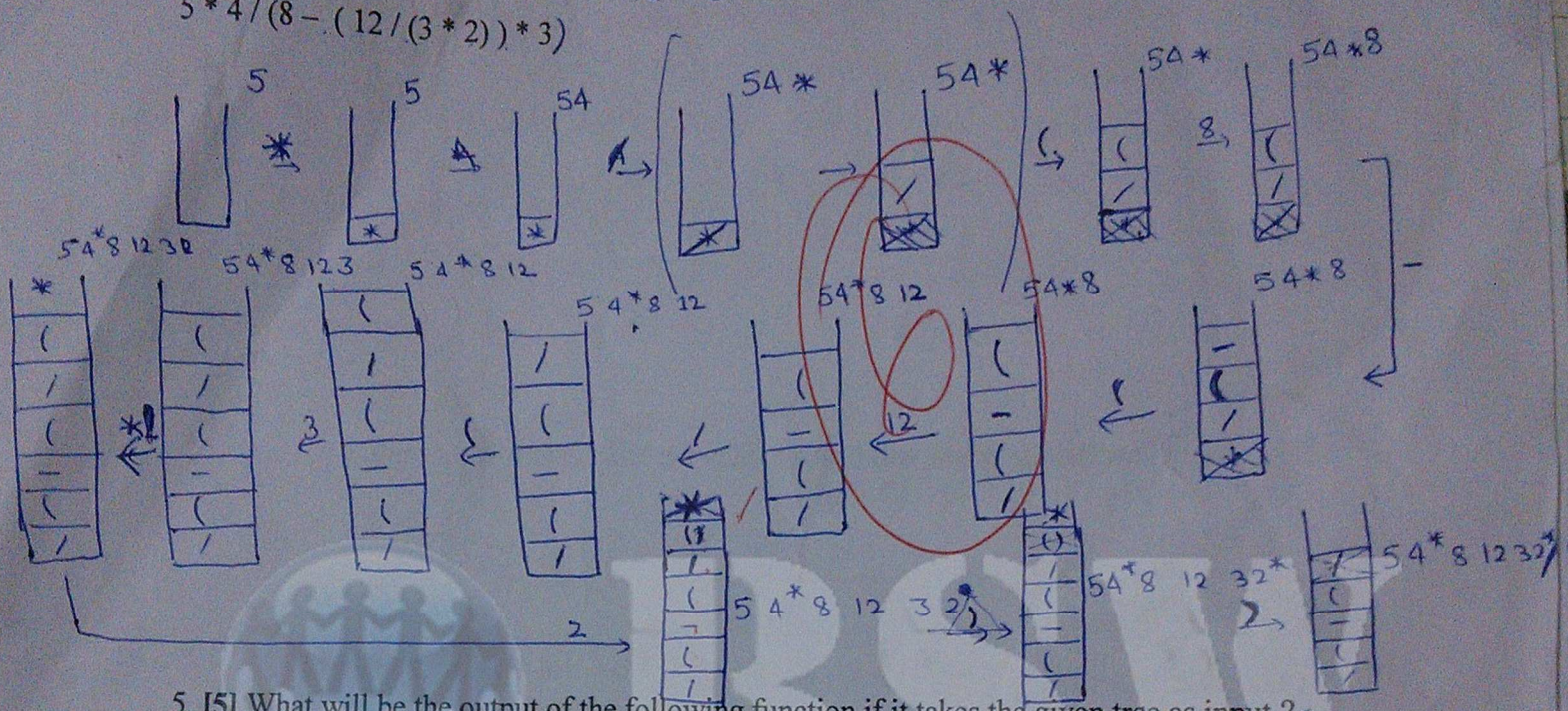
4. **[6]** Convert the following expression into postfix notation using a stack. Show the entries in the stack every time a character is read from the expression.

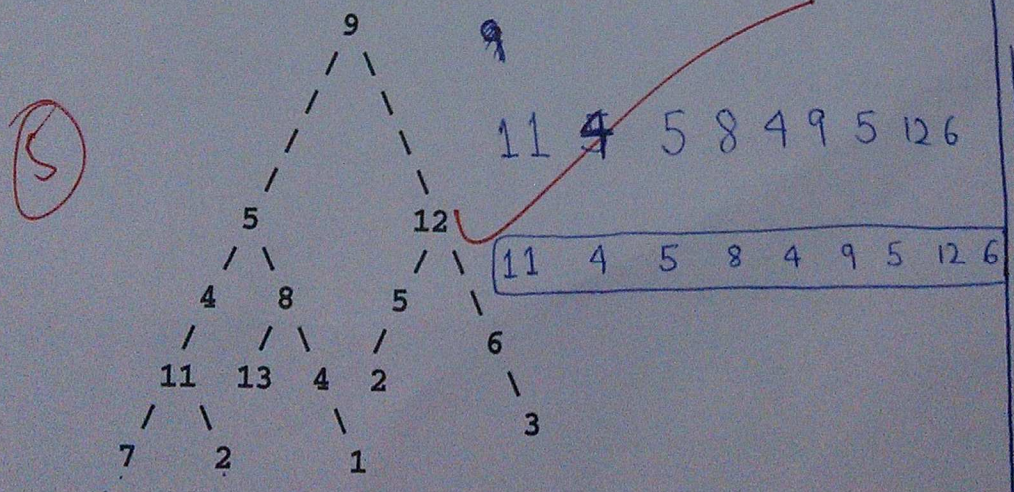
The character on the arrow is the character read from expression

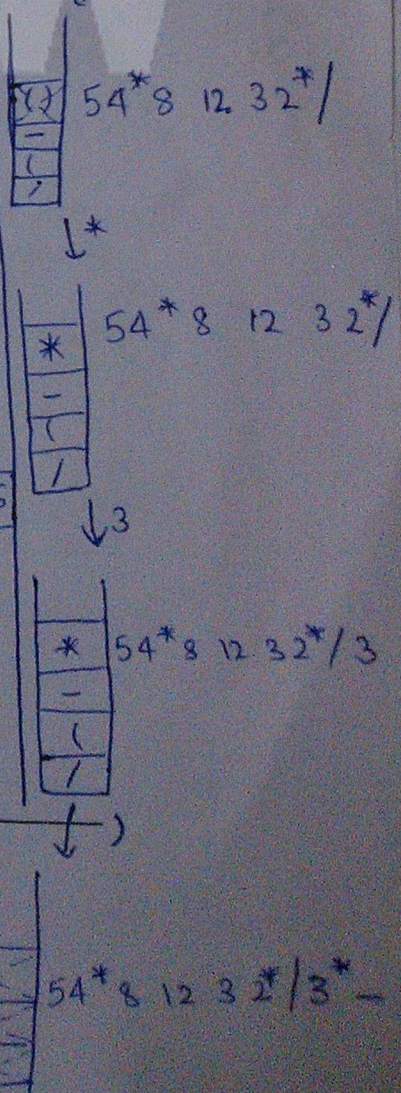
5 * 4 / (8 – (12 / (3 * 2)) * 3)



5. **[5]** What will be the output of the following function if it takes the given tree as input ?

```
void wonder ( node *p) {
        wonder ( p -> left);
        if (p -> right != NULL || p -> left != NULL){
                cout << p -> data << " ";}
        wonder (p -> right);}
```





6. [3] What is the maximum number of nodes in a binary tree if it contains 120 leaf nodes? Justify your answer.

Max nodes = 240 (correct answer is infinite)

(3) → As we go down, no of nodes(max) is doubled. In 8th level we have 128 nodes(max). But we need 120. So we remove 8 nodes which is 4 nodes from above level, 2 from above that & 1 from above that is removed. total nodes = (1+2+4+8+16+32+64+128) − (1+2+4+8)

= 16+15

7. [5] Indicate how the list below will change when we call the following routine

first-> 57– 55 – 92 – 40 – 62 – 84 – 78

```
void magic(node *first)
{
  struct node *p = first,
              *q = NULL,
              *r;
  while (p != NULL)
  {        :
     r = q;
     q = p;
     p = p->next;
     q->next = r;
  }
    q = first;   → error: first = q;
}                    should be there
```

(5)

Output:

first → 78 - 84 - 62 - 40 - 92 - 55 -