

Indian Institute of Technology Mandi
IC150: Computation for Engineering
Tutorial 4

- 1) Draw a neat diagram showing the memory allocated, with values, after execution of the lines labelled (A) and (B) in the following sequence:

```
typedef struct node {  
    float val;  
    struct node *next;  
} * NodeType;  
NodeType p, head;  
  
p = malloc(sizeof NodeType); p->val=2.73; p->next=NULL;  
head = p; // Line (A)  
p = malloc(sizeof NodeType); p->val=-32; p->next=head;  
head = p; // Line (B)
```

- 2) A linked list is represented by a single pointer NodeType head.
- (a) Write a **recursive** function PrintList() in which each call prints one element. The call PrintList(head) should result in the entire list being printed in order.
 - (b) [Difficult] Write a function RevPrint() that prints the elements in reverse order.
 - (c) [More Difficult] If the list size is n, what is the time complexity of your function RevPrint()? Modify the function so that its time complexity is O(n).
- 3) Write a C function char *GenString(char ch, int len). This function allocates storage for a string of len characters each having value ch. It returns the new string. Eg. GenString('a', 3) returns the string "aaa" and GenString('z', 0) returns the empty string "".
- 4) (a) Draw a neat flow-chart for the Regula-Falsi method of finding the roots of an equation.
(b) Given the initial interval $[x_0, x_1] = [0, 2]$, what is the new interval after one iteration of the Regula-Falsi method?
- 5) Derive an expression for the minimum number of iterations required in the bisection method, with initial interval $[a, b]$ bracketing the root, to get a root within an interval of length e .
- 6) It is desired to find the root of the function $f(x) = 5x^2 + 3x - 6$ using the Newton-Raphson method. Given $x_0 = 0$, compute x_1 and x_2 .