

Indian Institute of Technology, Patna  
Lisp Assignment  
Full Marks: 40

06/11/2016

1. Write a Lisp program (Marks -  $6 \times 2 = 12$ )
  - (a) to find the length of a list.
  - (b) to increment the elements of a list.
  - (c) to reverse a list.
  - (d) to append a list L2 with a given list L1.
  - (e) to check if a element is a member of a list.
  - (f) to remove duplicates from the given list.
2. Write Lisp programs to perform union, intersection, difference, and XOR of two lists. [Hint: XOR of two lists contains all elements of the two lists except the common elements.] (Marks - 8)
3. Write a Lisp program to calculate factorial of a number. (Marks - 3)
4. Simulate the *push* and *pop* operations of a stack in Lisp. (Marks - 4)
5. Write a program in LISP to compute the derivative of the following functions: (Marks - 8)
  - (a)  $e^x$
  - (b)  $\sin x$
  - (c)  $\log x$
  - (d)  $1/x$
  - (e)  $a_n x^n + a_{n-1} x^{n-1} + \dots + a_r x^{n-r} + \dots + a_0$

[Hint: The equivalent expressions of the first four functions in Lisp are (exp x), (sin x), (log x), (/ 1 x) respectively.]

6. A, B and C belong to the Himalayan club. Every member in the club is either a mountain climber or a skier or both. A likes whatever B dislikes and dislikes whatever B likes. A likes rain and snow. No mountain climber likes rain. Every skier likes snow. Write a program in LISP to determine whether there is a member who is a mountain climber and not a skier? (Marks - 5)