**ESC101 : Fundamental of Computing**

Lab 11 for 3 November 2008

Maximum Marks = 10

1. (5 marks)
   This exercise is to provide you a better insight into the execution of recursive methods. Write a recursive method for computing factorial of nonnegative integer $n$ based on the following recursive formulation.

$$fact(n) = \begin{cases} 1 & \text{if } n = 0 \\ n * fact(n-1) & \text{otherwise} \end{cases}$$

   You have to augment your program so that, at the start and end of each method call, the contents of the excution stack is printed on the screen. For example let us suppose you execute your program for $n = 3$, then the following pattern should appear on the screen.

```
main
main - fact(3)
main - fact(3) - fact(2)
main - fact(3) - fact(2) - fact(1)
main - fact(3) - fact(2) - fact(1)
main - fact(3) - fact(2)
main - fact(3)
main
```

   Your program should read the value of $n$ from command line.

2. (5 marks)
   There is a ladder consisting of $n$ horizontal bars, each pair of consecutive bars are separated by a distance of 1 feet. A person is standing at the bottom of the ladder. He/She may either climb 1 bar, 2 bar or 3 bars in a single step. Print all ways of reaching the top of the ladder. You should also return the total number of ways of climbing the ladder. The value of $n$ is provided from command line. For example, if $n = 4$, the answer should be:

```
There are total 7 ways :
-1-1-1-1
-1-1-2
-1-2-1
-1-3
-2-1-1
-2-2
-3-1
```