

## 763114P ATK I – Introduction to C-programming Fall 2006 Exercise 4

1. Write a program that calculate the factorial  $n! = 1 \cdot 2 \cdots (n-1) \cdot n$  using while, do-while, and for loops, and some n given by the user.
2. Write a program that reads numbers from the user and prints how many of the given numbers were greater than five. The program should stop when it is given a negative number.
3. Make a program that asks for a real number x and an integer n, and calculates the sum

$$\sum_{k=0}^n \frac{x^k}{k!}$$

4. Write a program where you introduce a function that calculates the value of  $1/(1-x)$ . The function is to get x as its argument and it should give the result as its return value.
5. Write a function called, say, exps, that calculates the sum of Ex. 2. The function should take x and n as its arguments and give the sum as its return value. Compare the results of your function to those of exp(x). Print to screen the values of your function, exp(x) and their difference. To use exp(x) (it calculates  $e^x$ ) you need to include the #include <math.h> directive.
6. Extra: Change the summation in Ex. 2 so that the sum is computed until adding new terms does not change the sum.
7. Extra (evil): Functions may call themselves. This kind of functions are called recursive and in some programming languages recursive functions are a common way to program a loop. Calculate the factorial using a recursive function. As an aid you can use the following definition for the factorial (denoting  $n! = f(n)$ ):

$$f(n) = \begin{cases} 1, & n = 0 \\ n f(n-1), & n > 0 \end{cases}$$