ESC 251 **HW 28** **Due: Oct. 27**

For each program below, you should write the requested subroutines and a main program to test them.

1) (4 pts) Functions can call other funtcions. Whenever you need to write a new function, it's a good idea to make use of any existing functions you have already written. Consider the binomial coefficient $C(n,k)$ defined by:

$$C(n,k) = \left(\begin{array}{c} n \\ k \end{array} \right) = \frac{n!}{k!\,(n-k)!}, \quad n \geq k.$$

Write a function that will compute the binomial coefficient given the values of n and k. Your function should compute the factorials in the binomial coefficient formula by calling the factorial function you wrote in Homework 19.

Use your function to compute the values of $C(3,1)$, $C(5,3)$, $C(14,5)$, and $C(10,0)$.

2) (7 pts) You may recall the binomial theorem from algebra:

$$(a+b)^n = \sum_{k=0}^{n} \left(\begin{array}{c} n \\ k \end{array} \right) a^k\, b^{n-k}.$$

Write a function that will compute $(a+b)^n$ using the binomial theorem. You should send in values of a, b and n to your function. Test your function using the values $a = 3.2, b = -1.5, n = 10$. Compute the relative error in your function value to the value that you get by computing $(a+b)^n$ directly.