Deadline: Thursday 27 January 2005

Question 1 *F90 "essay"*

Put a short essay on

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on the Web forum.

Guidelines:

- Keep your posting concise, but provide enough context for the others to understand your points.

- Aim at 30 (maximum 40) lines of text (excluding code examples ans links) as seen in the Preview window.

- Include code examples that demonstrate the technique / feature, etc. Keep the examples short, but non-trivial.

- Include a few useful links of web resources at the end.

Question 2 *Free fall*

Imagine you stand in the middle of the Albertan prairie and throw a stone (almost) vertically up with initial speed $v_0 = 15 \, \text{m/s}$.

(a) How does height z evolve as a function of time t?

(b) Write a F90 function `height(t,v0,g)` that implements this relationship and verify it gives the correct result for $t = 2 \, \text{s}$ and $t = 4 \, \text{s}$.

(c) Write a F90 program that prints a table of the form

```
# Ballistic flight of stone; g=const, neglecting friction
# Parameters:  g = 9.81 [m/s],  v0 = 15.00 m/s
#
#      t [s]          z [m]
#      0.00          0.0000
#      0.20          ......
#      0.40          ......
#       .              .
#       .              .
#       .              .
#      5.00          ......
```

(d) Remember that you are *not* drilling for oil. So make sure the stone does not dig a deep hole.

Question 3 *Binomial coefficients by recursion*

The binomial coefficients $\binom{n}{k}$ for integers $n \geq 0$, k are completely defined by the relations

$$\binom{n+1}{k} = \binom{n}{k-1} + \binom{n}{k}, \tag{1}$$

$$\binom{0}{0} = 1, \tag{2}$$

$$\binom{0}{l} = 0 \qquad \forall\, l \neq 0. \tag{3}$$

(a) Write a recursive function `binom(n,k)` that implements these relations and tabulate the binomial coefficients (i.e. produce some sort of *Pascal triangle*).

(b) Is this way of building the Pascal triangle efficient? Suggest a more efficient method.