Exercises to carry out in MPI /OpenMP
(valid for the Easter Bonus Exam!)
Please send codes + brief report + timings (where possible) before 12.05.2014)

Perform the exercises using PREFERABLY collective communication operations and, where possible (e.g. pay attention to dynamically allocated 2D matrixes!), distribute data to the various processes by Scatter operations and collect the results by Gather operations.

1. Hello World Version 0 - Each process writes to the screen the message "Hello from process x"

2. Hello World version 1 - Modify the greetings.c (see slides) program so that:
a. The root process sends an integer to each process;
b. These will be compute the double of the number and send the result to root

3. Numerical integration (as explained in class)

Dynamically allocate the used data structures (e.g., read from the keyboard the data size) for the following exercises:

4. Find the maximum in an array

5. Sum of two matrices

6. Product of two matrices using “standard” algorithms seen in class so far

7. Calculation of PI with the Monte Carlo method

8. Sum of the elements of a vector of n elements with the reverse "binary tree" method - ln (n) steps ...

HARD:
9. Simple parallel sort of a vector (locally with a classical method – bubblesort(?) and subsequent merging phase)...

HARD:
10. Find an element in a vector / matrix (with blocking and non-blocking messages)

After implementing the version in MPI, use OpenMP instructions wherever possible, taking appropriately times (varying the number of processes and the number of threads), reporting times, speedup, efficiency in an Excel chart.
Please use appropriate multi-core machines (no dual-cores! :)