

Warm-up Homework: Vectorization

Generate the vector $y = \sin(x^2)$ for $x \in [0, \pi]$ in three ways:

a) sequential, using a 'for-loop', for example:

h = π/n ; for $i = 0 : h : \pi$, $y(i) = \sin(i)$; end

b) the same as in a) preceded by the initialization of y, i.e. setting

y = zeros(1, n);

c) vectorized, using the commands (familiarize yourself with Matlab 'dot' operations):

*x = linspace(0, π , n - 1); y = sin(x.*x);*

Verify experimentally using Matlab how the cost, c , of these operations depends on n , the size of the problem (suggestion: use 'tic' and 'toc' to measure the cpu). Derive the form of this dependence, $c = an^p$, and plot it (in one frame) using loglog scale. Compare the computed values of p and a with the theoretically predicted ones. Draw conclusions.