ASSIGNMENT 3 - Solution

Problem 3 - Solution

Some general remarks:

1. MATLAB's timing mechanism is only accurate to about a few milliseconds.

2. The run-time of a given code typically fluctuates up and down by 5-10%. You can see that if you repeat the same computation several times. Therefore differences in run-time of that amount must be considered as insignificant and must be ignored.

3. The operations of addition, subtraction, multiplication and division of any two numbers require so little time that we have to perform such operations many times in order to obtain accurate timing.

4. If one vectorizes the operations, then one has to be sure that the system has enough memory so that reported times are not affected by memory related issues.

5. Using MATLAB's function `cputime` is more accurate than using `tic toc` since the result from the latter may be affected by other operations that the system may be running at the time.

One finds that the operations of addition, subtraction and multiplication all require about the same amount of time. Division however is about 60% slower. In MATLAB, operations involving integers take about the same time as the same operations involving floating points. This is expected since MATLAB has no separate data type for integers. They are treated as floating points.

If the elements of a long vector are being divided by a fixed scalar such as `pi`, one can speed up the computation by first calculating the reciprocal of that scalar and storing it as a scalar variable. That value is then used to multiply the elements of the vector. We expect and indeed find the computation to be about 50% faster.