HW1 solution

1 See file msort.f95

2 ab) See file 91.html

c) Programmer's productivity

It should be clear form this exercise that a programmer can write more functional-style code than imperative-style code in a given time interval.

Time complexity

It should be clear that both styles have the same time complexity, because the number of time the recursive function is called equals to the number of times the loop is executed.

Space complexity

The imperative-style function takes constant space; but the functional-style takes more spaces, because recursion consumes runtime stack space.

Comment

Let

$t(n)$ = the number of times the loop is executed in the imperative style

or

$t(n)$ = the number of times the recursive function is called in the functional style

It is not hard to show that

$t(n) = 1, \text{if } n > 100; = 2(101 - n) + 1, \text{ otherwise}$

3 See file bsort.pl

4 See file fib.pl