CIS 360 Lab #3: Design Algorithm in Pseudo Code and Compare Running Time

Pseudo Code Standard and Examples

- A combination of good English and good coding conventions
- Use program control keywords such as: for/while/do loop, if, switch, return.
- Use meaning names for variables and methods.
- Ignore unnecessary details and independent of program language.

A pseudocode standard : http://users.csc.calpoly.edu/~jdalbey/SWE/pdl_std.html

Task A. (Ch1-2) Write an algorithm that finds the m smallest numbers in a list of n numbers without sorting all n numbers, in pseudo code, and implement it.

Task B. Implement Algorithm 1.6 [nth Fibonacci Term, Recursive]{Textbook: Page13}
Execute the program for n=10, 30, 40, 50, 60, 65, 70, record the running time T for each run, calculate $T/2^{n/2}$. (* time calculation is in miliseconds)

n=	**10**	**30**	**40**	**50**	**60**	**65**	**70**
T	0*	12	430	50013			
$T/2^{n/2}$	0	0.000366210	0.00041	0.0014905			

What is the trend of this sequence when n→ infinite? Given that the time complexity of the recursive version is O(2^n), so, while T increases exponentially, T/(2^(n/2)) remains more or less constant.

Task C. Implement Algorithm 1.7 [nth Fibonacci Term, Iterative]]{Textbook: Page16}
Execute the program for n=50, 100, 1000, 10000, 50000, 1000000, record the running time T for each run, calculate T/n.

n=	**50**	**100**	**1000**	**10000**	**50000**	**1000000**
T	67700	71300	96100	254500	1220100	5019200
T/n	1354	713	96.1	25.45	24.402	5.0192

What is the trend of this sequence when n→ infinite?

Given that the time-complexity of the iterative solution is O(n), the trend for T/n sequence will be constant plateau over infinite iterations.