

Introduction to Software Engineering – classes no 1

Write a flowchart, and – basing on it – a function (in java, c++ or c#) solving following problems:

1. Calculate the n-th value of Fibonacci sequence, knowing that $f_0 = 0$, $f_1 = 1$, $f_n = f_{n-1} + f_{n-2}$
2. Check if a given natural number is a prime number.
3. Write a given natural number as a product of prime numbers, e.g. 16 -> 2 * 2 * 2 * 2, 21 -> 3 * 7
4. Convert a natural number written in decimal system in the p system ($1 < p < 10$).
5. Calculate $\sin(x)$ using the formula:

$$\sin(x) = x - \frac{x^3}{3!} + \frac{x^5}{5!} - \frac{x^7}{7!} + \dots$$

Finish the calculation when: (a) the exponent is equal to a given n; (b) the difference between two approximations is less than a given epsilon.

6. Calculate $W(x) = a_n x^n + a_{n-1} x^{n-1} + \dots + a_1 x + a_0$ for a given x. Present two alternative solutions: (a) naive, (b) using the Horner's schema: $W(x) = a_0 + x(a_1 + x(a_2 + \dots + x(a_{n-1} + x a_n) \dots))$