

## Example of the test of Numerical methods

date

1	2	3	4	$\Sigma$	Name:
					Number:

### Task 1 (6 points).

The function  $f(x) = e^{x^2-x} - 2$  has one positive root. Find the interval in which this root lies and on which the Fourier conditions for convergence of the Newton's method are met. Verify these conditions. Then choose the appropriate initial iteration and calculate the next three iterations using Newton's method.

### Task 2 (4 points).

Describe and graphically illustrate the regula falsi method. Specify the iterative relationship and demonstrate the method for finding the  $\sqrt{5}$  (at least 3 iterations).

### Task 3 (5 points).

The following system of linear equations is given:

$$4x_1 + 4x_2 + x_3 = 5$$

$$x_1 + 6x_2 + 3x_3 = -1$$

$$2x_1 - x_2 - 5x_3 = 0$$

Use the Jacobi iteration method to find the approximate solution.

Choose the initial iteration  $x^0 = (1, 1, 1)^T$  and calculate  $x^1$ ,  $x^2$  and  $x^3$ .

### Task 4 (5 points).

Use the composite Simpson rule to calculate approximately  $\int_{-\pi/2}^{\pi/2} \cos^3 x dx$ .

Split the interval  $[-\pi/2, \pi/2]$  into 4 and 6 subintervals.

Compare the result with the exact value.