Отчет

Лабораторная работа 2

«Метод Гаусса»

Задание 1: написать функцию gauss\_simple

Код функции gauss\_simple:

function X = gauss\_simple (A, b)

[N N] = size(A);

A = [A b];

for i = 1:N-1

A(i+1:N, i:N+1) -= A(i+1:N, i) \* A(i, i:N+1) / A(i, i);

endfor

b = A(:, N+1);

A = A(1:N, 1:N);

X = backsub(A, b);

endfunction

Код функции backsub:

function X = backsub(A, B)

% Вход - A - верхняя треугольная матрица размера n x n

% B - матрица размера n x 1

% Выход - X - решение системы линейных уравнений AX = B

% Находим размер матрицы B и инициализируем X

n = length(B);

X = zeros(n, 1);

X(n) = B(n)/A(n, n);

for k = n-1:-1:1

X(k) = (B(k) - A(k, k+1:n) \* X(k+1:n))/A(k, k);

endfor

endfunction

Код функции main:

system("cls");

printf("\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_SYSTEM 1\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\n");

printf("MATRIX:\n");

A = [

[2 4 -6];

[1 5 3];

[1 3 2]

]

printf("VECTOR b:\n");

b = [-4; 10; 5]

x = gauss\_simple(A, b);

printf("VECTOR x: Ax = b:\n");

x

printf("\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_SYSTEM 2\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\n");

printf("MATRIX:\n");

A = [

[2 4 -6];

[1 2 -1];

[1 3 2]

]

printf("VECTOR b:\n");

b = [-4; 3; 5]

x = gauss\_simple(A, b);

printf("VECTOR x: Ax = b:\n");

x

printf("\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_SYSTEM 3\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\n");

k = 2:16;

epsilon = 10.^(-k);

printf("VECTOR b:\n");

b = [-4; 3; 5]

i = 1;

for k = epsilon

printf("MATRIX:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\n");

A = [

[(2 + k) 4 -6];

[1 2 -1];

[1 3 2]

]

x = gauss\_simple(A, b);

printf("VECTOR x: Ax = b:\n");

x

X1(i) = x(1);

X2(i) = x(2);

X3(i) = x(3);

i++;

endfor

figure(1);

scatter(X1, epsilon);

grid on

title("FOR x\_1");

xlabel("X");

ylabel("Epsilon");

figure(2);

scatter(X2, epsilon);

grid on

title("FOR x\_2");

xlabel("X");

ylabel("Epsilon");

figure(3);

scatter(X3, epsilon);

grid on

title("FOR x\_3");

xlabel("X");

ylabel("Epsilon");