# National Aviation University

Aerospace Faculty

# **Laboratory Work #4**

«More programs to gain more experience in programming»

Completed: first year student

of ASF 117

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Kiev 2019

1.

% This program is improved version of MyCramer,

% it have input arguments A and b

% Examples of use

% >> A=[1 2 3; 4 5 6; 7 8 9]; b=[5; 6; 7];

% >>MyCramer(A,b)

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function x=MyCramer(A,b)

SizeA=size(A); % Checking if input argument A is correct

SizeB=size(b); % Checking if input argument b is correct

N=SizeB(1);

if SizeA(1)~=SizeA(2)

disp('Matrix should be square')

elseif (SizeB(2)~=1) | (SizeB(1)~=SizeA(1))

disp('The vector of right side of b should be a column')

else

D0=det(A);

for I=1:N

A1=A

A1( :, I)=b

D(I)=det(A1);

if (D(I)==0)&(D==0) %Checking if the only answer

disp('There are infinitely many answers')

elseif (D(I)~=0) & (D==0)

disp('There are no answers')

else

x(I)=D(I)/D0;

end

end

end

x=x'

2.

2.1. ;

function F0=pi(x)

% This program will find x in interval [-pi, pi]

% Examples of use:

% >> PieceWisePi(3)

% Copyright Denis Zakorko 15.12.2019

L=length(x); % Find length of vector x

for i=1:L % Loop for each element of vector x

xx=x(i);

if (xx>=-pi)&&(xx<pi) %Checking x to [-pi, pi]

disp('X is in interval [-pi, pi]')

F(i)=step(x(i));

else

disp('X is not in interval [-pi, pi]')

nT=0;

while ~ ((xx>=-pi)&&(xx<pi)) % Loop while x in interval [-pi, pi]

nT=nT+1;

xx=xx+2\*pi;

end

F(i)=step(xx);

while ~(xx>= -pi)&&(xx<pi) % Loop while x in interval [-pi, pi]

nT=nT+1;

xx=xx-2\*pi;

end

F(i)=step(xx);

end

end

function F=step(x) % Function equal x^2 if x in [-pi, pi]

if x<=0

F=x^2;

else

F=x^2;

end

3. % This program is MyNumDiff for dx=b-a/N

% Examples of use:

% >> MyNumDiff2

% >> sin(x)\*x

% >> [8, 9]

% Copyright Denis Zakorko 15.12.2019

syms x

F=input('Please enter a function' );

I=input('Please enter interval [a,b]' );

dF=diff(F);

ezplot(dF,I)

dx=(b-a)/N;

x=I(1):dx:I(2);

Fi=subs(F,x);

x2=x(2:end);

x1=x(1:end-1);

dx=x2-x1;

Fi2=Fi(2:end);

Fi1=Fi(1:end-1);

ddF=(Fi2-Fi1)./ddx;

hold on

plot(x(1:end-1),ddF,'k\*-')

4.

%Algorithm of Encryption

% Examples of use:

% >>Coding

% Copyright Denis Zakorko 15.12.2019

Text='Masha kasha';

CodedWord=char(Text+1)

%Algorithm of Decryption

% Examples of use:

% >>DeCoding

% Copyright Denis Zakorko 15.12.2019

DeCodedWord=char(CodedWord -1)

Conclusion: In this Laboratory Work I improved some my previous programs, especially added input arguments in some scripts. Also I learned what is PieceWise function and also tried to add some transcendental functions in MyNumDiff.

I learned how Encryption and Decryption work in MATLab and coded/decoded some text.

Also I added disp(…) in my scripts because it simplifies the understanding of each step and the whole algorithm as a whole.

So in conclusion I get more experience in programming.