%%%%%% Excercise 2.1 %%%%%%

s =5;

log((s^2)-(2\*s\*cos(pi/5))+1); % returns 2.8853

s =0.95;

log((s^2)-(2\*s\*cos(pi/5))+1); % returns -1.0069

s =1;

log((s^2)-(2\*s\*cos(pi/5))+1); % returns -0.9624

%%%%%% Excercise 2.2 %%%%%%

x = 2 + 3i ; y = 1 - 1i;

z1 = x - y; % returns 1.0000 + 4.0000i

z2 = x \* y; % returns 5.0000 + 1.0000i

z3 = x / y; % returns -0.5000 + 2.5000i

%%%%%% Excercise 4.1 %%%%%%

A = [ 1 2 -1

-2 -6 4

-1 -3 3 ];

b = [1; -2; 1];

x = A\b; % returns [-1; 2; 2]

A\*x; % A\*x retuens b

b;

A\*x-b; % returns [0; 0; 0]

%%%%%% Excercise 4.2 %%%%%%

A = [1 2 3 4

1 4 9 16

1 8 27 64

1 16 81 256 ];

det(A); %returns 288

eig(A); % 277.9265 \*

% [8.9315

% .1127

% 1.0292]

inv(A);% 4.0000 -4.3333 1.5000 -0.1667

% -3.0000 4.7500 -2.0000 0.2500

% 1.3333 -2.3333 1.1667 -0.1667

% -0.2500 0.4583 -0.2500 0.0417

%%%%%% Excercise 4.2.1 %%%%%%

det(A(1:3,1:3)); %returns 12

B = [1 1 0 0

0 2 1 0

0 0 3 1

0 0 0 4];

c = [1;0;0;-1];

5\*B; % 5 5 0 0

% 0 10 5 0

% 0 0 15 5

% 0 0 0 20

B\*c; % [1;0;-1;-4]

A\*B; % 1 5 11 19

% 1 9 31 73

% 1 17 89 283

% 1 33 259 1105

B\*A;

%%%%%% Excercise 4.4 %%%%%%

b = [1 0 0 1]';

x = inv(A)\*b;

A\*x; b; %they are equal

A = [1 1/2 1/3

1/2 1/3 1/4

1/3 1/4 1/5];

b = [1/4; 1/5; 1/6];

x = A\b;

A\*x-b; %solution does satisfy the equations

A = rand(700);

b = rand(700,1);

ti = cputime();

x = A\b;size(x);

compute\_time = cputime() - ti;

%total time to compute was 0.0156s

A = rand(700);

b = rand(700,1);

ti = cputime();

x = inv(A)\*b;size(x);

compute\_time = cputime() - ti;

%total time to compute was 0.0625s

%%%%%% Excercise 5 %%%%%%

A = [-8 3 5

3 -12 4

5 4 -12];

b = [-5; 0;0];

x = A\b; % 1.2903

% 0.5645

% 0.7258

% this is the same as in the slides

A = [-8 3 5

3 -12 4

5 4 -12];

b = [-12; 0;0];

x = A\b; % When replacing the 5v voltage source with 12v

% 3.0968

% 1.3548

% 1.7419

%%% Crammers rule %%%

A = [-8 3 5

3 -12 4

5 4 -12];

b = [-5; 0;0];

A1 = A;

A1(1:3, 1) = b;

I1 = det(A1)/det(A); % Returns 1.2903

A2 = A;

A2(1:3, 2) = b;

I2 = det(A2)/det(A); % Returns 0.5645

A3 = A;

A3(1:3, 3) = b;

I3 = det(A3)/det(A); % Returns 0.7258

%%% My 4 equations are:

%%% -13.7I1 +4.7I2 + 2.2I3 +0 = -6

%%% 4.7I1 -15I2 +0 +8.2I4 = 6

%%% 2.2I1 +0 -25.4I3 +22I4 = -5

%%% 0 +8.2I2 +22I3 -31.3I4 = 9

A = [-13700 4700 2200 0

4700 -15000 0 8200

2200 0 -25400 22000

0 8200 22000 -31300];

b = [6; -6; 5; -9];

x = A\b;

% Outputs 0.0031

% 0.9618

% 0.6920

% 1.0259