Question 1: - 1st Part



VARIATION OF PARAMETER

CODE: -

clc

syms x r c1 c2

p1 = input('Enter the coefficient of D2y: ');

p2 = input('Enter the coefficient of Dy: ');

p3 = input('Enter the coefficient of y: ');

eq = p1\*r^2+p2\*r+p3;

r = solve(eq,r);

p = real(r(1));

q = imag(r(1));

if q~=0

y1 = exp(p\*x)+cos(q\*x);

y2 = exp(p\*x)+sin(abs(q)\*x);

elseif r(1)==r(2)

y1 = exp(r(1)\*x);

y2 = x\*exp(r(1)\*x);

else

y1 = exp(r(1)\*x);

y2 = exp(r(2)\*x);

end

y\_c = c1\*y1 + c2\*y2;

w = simplify(y1\*diff(y2)-y2\*diff(y1));

f = input('Enter the non homogenous part: ');

y\_p = -y1\*int(y2\*f/w)+y2\*int(y1\*f/w);

y = simplify(y\_c+y\_p);

disp('The general solution of the given ODE is: ')

disp(y)

a = input('Enter the value of a: ');

b = input('Enter the value of b: ');

c = input('Enter the value of y(a): ');

d = input('Enter the value of y(b): ');

eq1 = subs(y,x,a)-c;

eq2 = subs(y,x,b)-d;

[c1, c2] = solve(eq1,eq2);

y = subs(y);

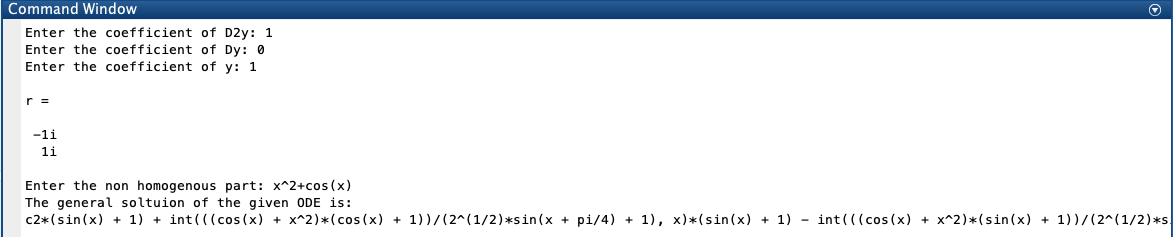
disp('Solution of the boundary value problem is given by: ')

disp(y)

ezplot(y,[a,b])

INPUT: -

COMMAND WINDOW: -

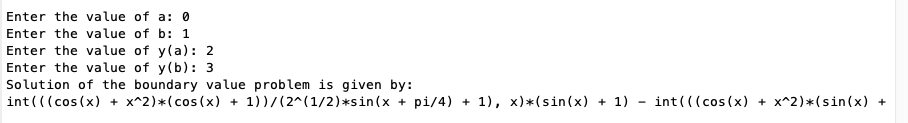


The general solution of the given ODE is:

c2\*(sin(x) + 1) + int(((cos(x) + x^2)\*(cos(x) + 1))/(2^(1/2)\*sin(x + pi/4) + 1), x)\*(sin(x) + 1) - int(((cos(x) + x^2)\*(sin(x) + 1))/(2^(1/2)\*sin(x + pi/4) + 1), x)\*(cos(x) + 1) + c1\*(cos(x) + 1)

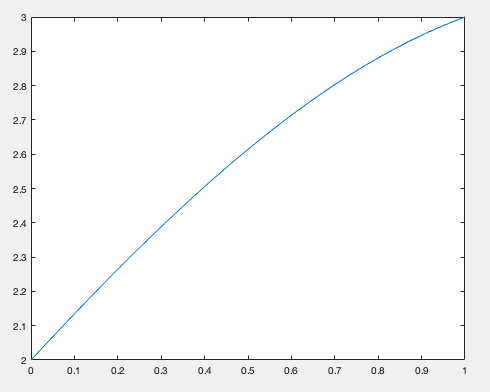
GRAPH: - Cannot be made because the boundary value is too big but if I use fplot instead of ezplot then a graph is coming.

COMMAND WINDOW: -

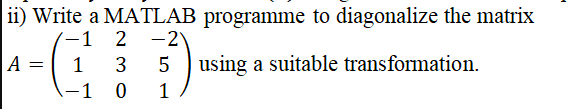


int(((cos(x) + x^2)\*(cos(x) + 1))/(2^(1/2)\*sin(x + pi/4) + 1), x)\*(sin(x) + 1) - int(((cos(x) + x^2)\*(sin(x) + 1))/(2^(1/2)\*sin(x + pi/4) + 1), x)\*(cos(x) + 1) - ((sin(x) + 1)\*(2\*cos(1) - 2\*cos(1)\*subs(int(((cos(x) + x^2)\*(sin(x) + 1))/(2^(1/2)\*sin(x + pi/4) + 1), x), x, 1) + 2\*sin(1)\*subs(int(((cos(x) + x^2)\*(cos(x) + 1))/(2^(1/2)\*sin(x + pi/4) + 1), x), x, 1) + 2\*subs(int(((cos(x) + x^2)\*(cos(x) + 1))/(2^(1/2)\*sin(x + pi/4) + 1), x), x, 1) - 2\*subs(int(((cos(x) + x^2)\*(sin(x) + 1))/(2^(1/2)\*sin(x + pi/4) + 1), x), x, 1) - cos(1)\*subs(int(((cos(x) + x^2)\*(cos(x) + 1))/(2^(1/2)\*sin(x + pi/4) + 1), x), x, 0) + 2\*cos(1)\*subs(int(((cos(x)……and so on the eq. is too big.

GRAPH: -



Question 1: - 2nd Part



DIAGONALIZATION

CODE: -

clc

A = input('Enter the square matrix A: ');

n=length(A);

[X,D] = eig(A);

disp('The Eigenvalue of A are')

disp(diag(real(D)))

disp('The eigen vectors for the corresponding eigenvalues')

disp(X)

option = input('If you want to diagonalize by similarity tranformation then press 1 or any other key if you want to diagonalize orthogonal matrix. ')

if(option==1)

P=X;

disp('Modal Matrix associated with A is ')

D=inv(P)\*A\*P

disp('D = inv(P)\*A\*P')

disp('Thus A is reduced to the diagonal matrix D through P by similarity transformation')

else

for i=1:n

x = X(:,i);

u(:,i)=x/norm(x)

end

disp('Orthogonal matrix associated with A is the matrix')

P1 = u(:,1:n)

disp('D=transpose(P1)\*A\*P1')

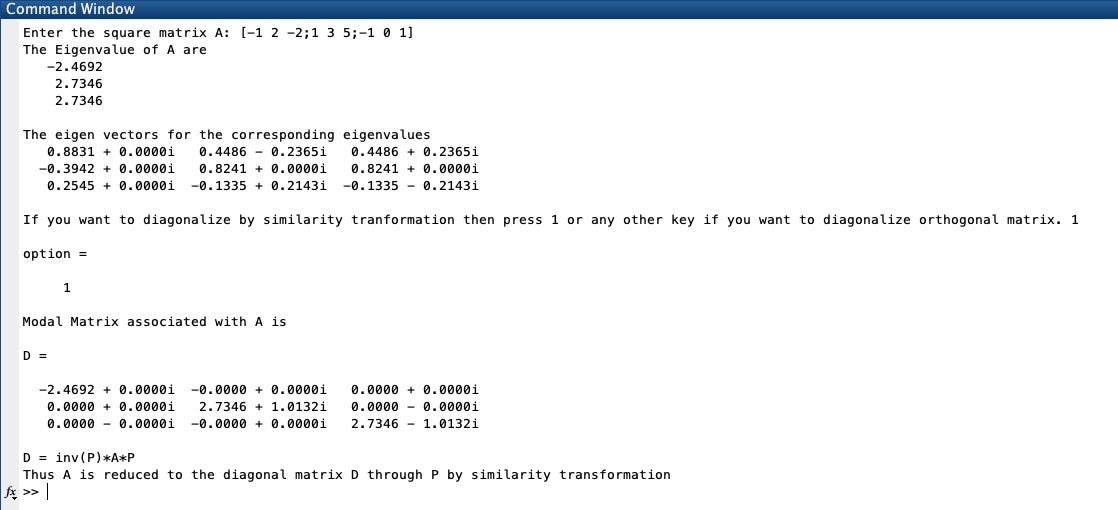
D = (P1)'\*A\*(P1)

disp('Thus A is reduced to the diagonal matrix D through P1by orthogonal tranformation.')

end

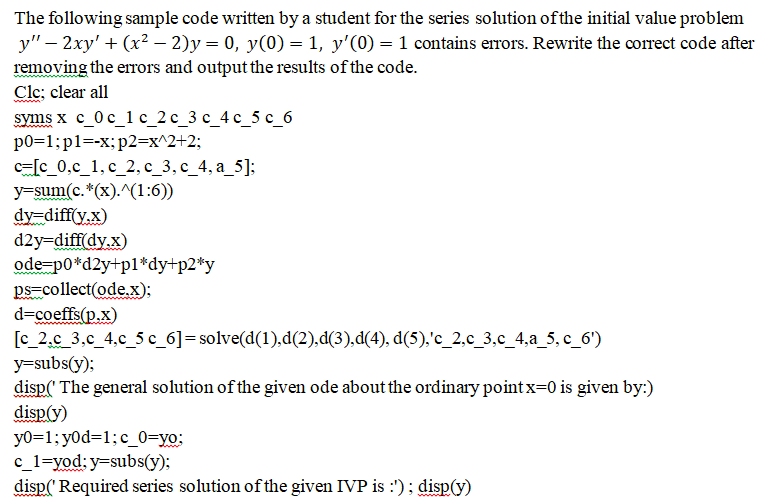
INPUT: -

COMMAND WINDOW: -



\*This Question is done by similarity transformation not by orthogonal transformation. \*

Question 2: - (Debugging)



CORRECT CODE: -

clear all

clc

syms x c\_0 c\_1 c\_2 c\_3 c\_4 c\_5 c\_6

p0=1;

p1=-2\*x;

p2=x^2-2;

c = [c\_0,c\_1,c\_2,c\_3,c\_4,c\_5,c\_6];

y = sum(c.\*(x).^(0:6));

dy=diff(y);

d2y = diff(dy);

ode=p0\*d2y+p1\*dy+p2\*y;

ps=collect(ode,x);

d = coeffs(ps,x);

[c\_2,c\_3,c\_4,c\_5,c\_6] = solve(d(1),d(2),d(3),d(4),d(5),c\_2,c\_3,c\_4,c\_5,c\_6);

z = subs(y);

disp(' The general solution of the given ode around x=0 is given by: ')

disp(z)

y0=1;

y0d=1;

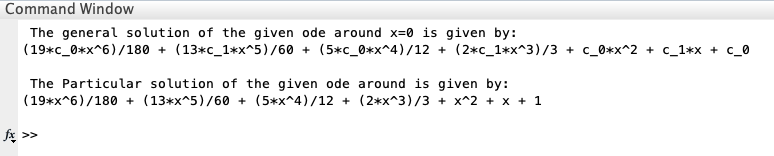
zz = subs(z,[c\_0,c\_1],[y0,y0d]);

disp(' The Particular solution of the given ode around is given by: ')

disp(zz)

ezplot(zz,[-4 4])

COMMAND WINDOW: -



GRAPH: -

