Computer Assignment 2.

For MA3012/MA7012 Scientific Computing

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# Task№1.

A)

function [ck,ddiff] = newton\_coef(X, Y)

n = length(X);

ddiff= zeros(n, n);

ddiff(:, 1) = Y';

for j = 2:n

for i = 1:(n-j+1)

ddiff(i,j) = (ddiff(i+1,j-1)-ddiff(i,j-1))/(X(i+j-1)-X(i));

end

end

ck = ddiff(n,n);

for k = (n-1):-1:1

ck = conv(ck,poly(X(k)));

m = length(ck);

ck(m) = ck(m) + ddiff(1,k);

end

ck = ddiff(1,:)

end

B)

function p = eval\_newton(x,X,ck)

n = length(X(:,1))

for k = 2:n

ck(k) = (ck(k) - ck(k-1))./(X(k)- X(k-1));

end

p = ck(n);

for k = n:-1:1

k

p = ck(n+1-k) + (x(k) - X(n+1-k))\*p;

end

% Display the results:

disp(['Values of p: num2str(p)]);

# Task№2.

A)

function [Y] =cubic(t,y)

n=length(t)

for i=2:n-1

a(i-1)=(t(i)-t(i-1))/6

end

for i=2:n-1

b(i-1)=(t(i+1)-t(i-1))/3

end

for i=2:n-1

c(i-1)=(t(i+1)-t(i))/6

end

for i=2:n-1

d(i-1)=(y(i+1)-y(i))/(t(i+1)-t(i)) - (y(i)-y(i-1))/(t(i)-t(i-1))

h(i-1)=t(i+1)-t(i)

end

b

T=zeros(n-2,n)

for i=1:n-2

T(i,i+1)= b(i)

T(i,i)=a(i)

T(i,i+2)=c(i)

end

T

T(:,n)=[];

T(:,1)=[];

T

for j=1:n-2

end

for k=1:n-2

end

for i=1:n-3

S=T(i+1,i)/T(i,i);

V=T(i+1,:)-S\*T(i,:);

T(i+1,:)=V;

d(i+1)=d(i+1)-S\*d(i);

end

Y(n-2)=d(n-2)/T(n-2,n-2)

for i=n-3:-1:1

Y(i)=(d(i)-T(i,i+1)\*y(i+1))/T(i/i)

end

Y=[0,Y,0]

end

B)

function [S] =cubic2(t,y,Y)

for i=1:length(t)-1

interv(i,1)=t(i)

interv(i,2)=t(i+1)

end

for j=1:length(t)

for i=1:length(t)

if interv(i,1) <=t(j) && t(j)<=int(i,2)

v(j)=i

end

end

end

for j=1:length(t)

h(i)=t(i+1)-t(i)

i=v(j)8

S(j)=y(i)+(1/h(i)\*(y(i+1)-y(i)-h(i)/6)\*(Y(i+1)+2\*Y(i)))\*(t(j)-t(i))+1/2\*Y(i)\*(t(j)-t(i))^2 + 1/6\*h(i)\*(Y(i+1)-Y(i))\*(t(j)-t(i))^3

end

| Example | | | | | |
| --- | --- | --- | --- | --- | --- |
|  | 1 | 2 | 3 | 4 | 5 |
| Alpha | 1 | 1 | 0 | 0 | 0 |
| Beta | 0 | 1 | 1 | 0 | 0 |
| Gamma | 0 | 1 | 1 | 1 | 0 |
| Workers per year | 50 | 100 | 50 | 30 | 0 |