UNIVERSITY OF LEICESTER

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)]);
```

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TaskNº2.

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
```