```
clear
clc

x = 0.5;
a = 0;
b = 0.5;
E = 1;

df = @(x) (1/sqrt(2*3.14159265))*exp(-(x.^2)/2);
f = @(x,a,b) integral(@(x) df(x)-0.45,a,b);
ft = @(x) (1/sqrt(2*3.14159265))*exp((-x.^2)/2);

fprintf('Newton Method\n')

NewtonRoot(f,df,x,E,100,a,b)

% Code derived from lecture notes

% function Xs = NewtonRoot(Fun,FunDer,Xest,Err,imax,a,b)
%
% for i = 1:imax
%     Xi = Xest - Fun(Xest,a,b)/FunDer(Xest);
%     if abs((Xi - Xest)/Xest) < Err
%         Xs = Xi;
%         Error = abs((Xi - Xest)/Xest)
%         break
%     end
%     Xest = Xi;
% end
% if i == imax
%     fprintf('Solution was not obtained in %i iterations.\n',imax)
%     Xs = ('No answer');
% end


clear x
clear b
clear E
clear iterations

E = 1;
b = 0.5;
x = b;

fprintf('Simpson 1/3 Method\n')

while E > 1*10^-5
    xi = x;
    x = f(x,a,b);
    b = x;
    E = abs(x - xi);
end
```

```
fprintf('X-value')
x
fprintf('Error')
E


clear x
clear b
clear E
clear iterations

E = 1;
b = 0.5;
x = b;

fprintf('Composite Simpson 1/3 Method\n')

t = a:0.1:b;
x = (0.1/3)*(ft(t(1))+ft(t(end))) + (0.1/3)*((4*ft(t(2)))+(4*ft(t(2))))...
    + (0.1/3)*((2*ft(t(3)))+(2*ft(t(5))))

fprintf('X-value')
x
fprintf('Error')
E


clear x
clear b
clear E

E = 1;
b = 0.5;
x = b;

fprintf('Trapezoidal Method')

CompTrapz(ft,a,b,100)

% function I = CompTrapz(Fun, a, b, n)
%
% % p1 = 'What is the lower bound of the integral?';
% % p2 = 'What is the upper bound of the integral?';
% % p3 = 'How many subintervals do you want?';
% % a = input(p1);
% % b = input(p2);
% % n = input(p3);
% x = linspace(a,b,n-1);
% % Fun = @(x) 2/(1+x.^2);
% % Fun = @(x) cos(x)^2;
% % n = 6 (start), then 12, 24, 48 96, and finally 192[p
% h = (b-a)/n;
```

```
% I = ((h/2)*(Fun(x(1)) + Fun(x(end)))) + (h*sum(Fun(x)-Fun(x(1))-Fun(x(end))))

fprintf('Therefore, for the given function, the upper bound is 0.59526.')
```

```
Newton Method

Error =

   0.190518838680695


ans =

   0.595259419340348

Simpson 1/3 Method
X-value
x =

    -2.282517184843440e-07

Error
E =

     4.698716151520963e-06

Composite Simpson 1/3 Method

x =

   0.181508455288348

X-value
x =

   0.181508455288348

Error
E =

     1

Trapezoidal Method
I =

  -0.180360889785266


ans =

  -0.180360889785266

Therefore, for the given function, the upper bound is 0.59526.
```

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