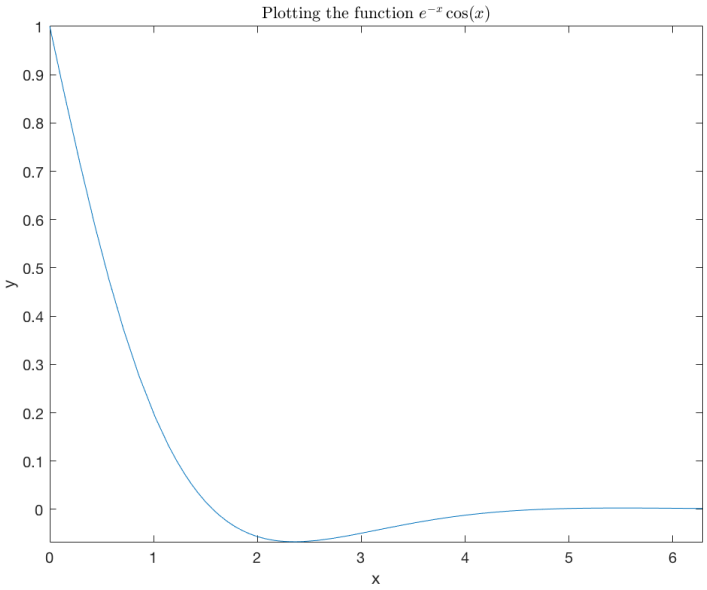
```
function testingforover32intervals
fprintf('testingforover32intervals\n');
f = @(x)exp(-x).*cos(x);
a = 0;
b = 2*pi;

fprintf('This is composite trapezoid rule over 32 intervals\n');
n = 32;
h = (b - a)/n;
trapezoid = 0.5*(f(a) + f(b));
for i = 1:n-1
    x = a + i*h;
    trapezoid = trapezoid + f(x);
end
trapezoid = trapezoid*h;
fprintf('The integral under trapezoid is %f.\n', trapezoid);
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
fprintf('This is composite midpoint rule over 32 intervals\n');
n = 32;
h = (b - a)/n;
midpoint = 0;
m = a + 0.5*h;
for i = 1:n
    midpoint = midpoint + h*f(m);
    m = m + h;
end
fprintf('The integral under midpoint is %f.\n', midpoint);

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
fprintf('This is composite three-point Gaussian over 32 intervals\n');
n = 32;
h = (b - a)/n;
t0 = -sqrt(3/5);
t1 = 0;
t2 = +sqrt(3/5);
A0 = 5/9;
A1 = 8/9;
A2 = 5/9;

ai = a;
int = 0.0;
for k = 1:n
    bi = ai + h;
    inti = 0.0;
    inti = A0 * f(0.5*(bi - ai)*t0 + 0.5*(bi + ai)) +...
        A1 * f(0.5*(bi - ai)*t1 + 0.5*(bi + ai)) +...
        A2 * f(0.5*(bi - ai)*t2 + 0.5*(bi + ai));
    inti = 0.5*(bi - ai)*inti;
    ai = bi; %reset ai for next loop
    int = int + inti;
end

fprintf('The integral under three-point Gaussian is %f.\n', int);
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
fprintf('This is composite Simpson 13 rule over 32 intervals\n');
n = 32;
h=(b-a)/n;
xi=a:h:b;
csimpson = h/3*(f(xi(1))+2*sum(f(xi(3:2:end-2)))+4*sum(f(xi(2:2:end)))+f(xi(end)));
fprintf('The integral under Simpson 13 rule is %f.\n',csimpson);

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
fprintf('Since the ideal solution is 0.4999066278634, composite threepoint Gaussian and composite simpson 13 yield closer results.');
figure
xrange = linspace(0,2*pi,100);
fplot(f,'-',[0 2*pi])
title('Plotting the function $e^{-x} \cos(x)$','Interpreter','latex')
xlabel('x')
ylabel('y')
```

```
testingforover32intervals
This is composite trapezoid rule over 32 intervals
The integral under trapezoid is 0.502277.
This is composite midpoint rule over 32 intervals
The integral under midpoint is 0.497459.
This is composite three-point Gaussian over 32 intervals
The integral under three-point Gaussian is 0.499066.
```

```
This is composite Simpson 13 rule over 32 intervals
The integral under Simpson 13 rule is 0.499050.
Since the ideal solution is 0.4999066278634, composite threepoint Gaussian and composite simpson 13 yield closer results.
```



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