
```
clc
clear
close all
format long g

%display name and assignment details
disp('Zyad Khan - MATLAB Chapter 8 Assignment')

%Problem 1 - Graphing
syms x

f(x) = log(sin (x)); % set the variable f(x) to equal ln(sin x)
g(x) = log(cos (x)); % set the variable g(x) to equal ln(cos x)

% Graph both f(x) and g(x) on the interval [-pi, pi]
fplot(f(x), [-pi,pi])
grid on; hold on;
fplot(g(x), [-pi,pi])
title('Graph of Natural Log of Sine and Cosine')
xlabel('x')
ylabel('y')
legend('ln (sin x)', 'ln (cos x)')

%Problem 2 - Improper Integral

Definite_Integral_of_f(x) = int(f(x),x,0,(pi/2)); % solve the definite
integral of the improper integral ln(sin x)dx from [0, pi/2]
Definite_Integral_of_g(x) = int(g(x),x,0,(pi/2)); % solve the definite
integral of the improper integral ln(cos x)dx from [0, pi/2]

if isfinite(Definite_Integral_of_f(x))
    fprintf('The integral of f(x)= ln(sin x) converges and the limit
    is %.3f.\n', Definite_Integral_of_f(x))
else
    fprintf('The integral diverges.') % if the improper integral is
    not a definite value, it is then determined as diverging.
end

if isfinite(Definite_Integral_of_g(x))
    fprintf('The integral of g(x)= ln(cos x) converges and the limit
    is %.3f.\n', Definite_Integral_of_g(x))
else
    fprintf('The integral diverges.') % if the improper integral is
    not a definite value, it is then determined as diverging.
end

%Problem 3 - Arc Length of the Curve
f_prime = diff(f(x)); % take the derivative of f(x) = ln(sin(x))
arc_length_formula = sqrt(1+(f_prime)^2); % the formula of arc length
is the square root of 1+ fprime^2
```

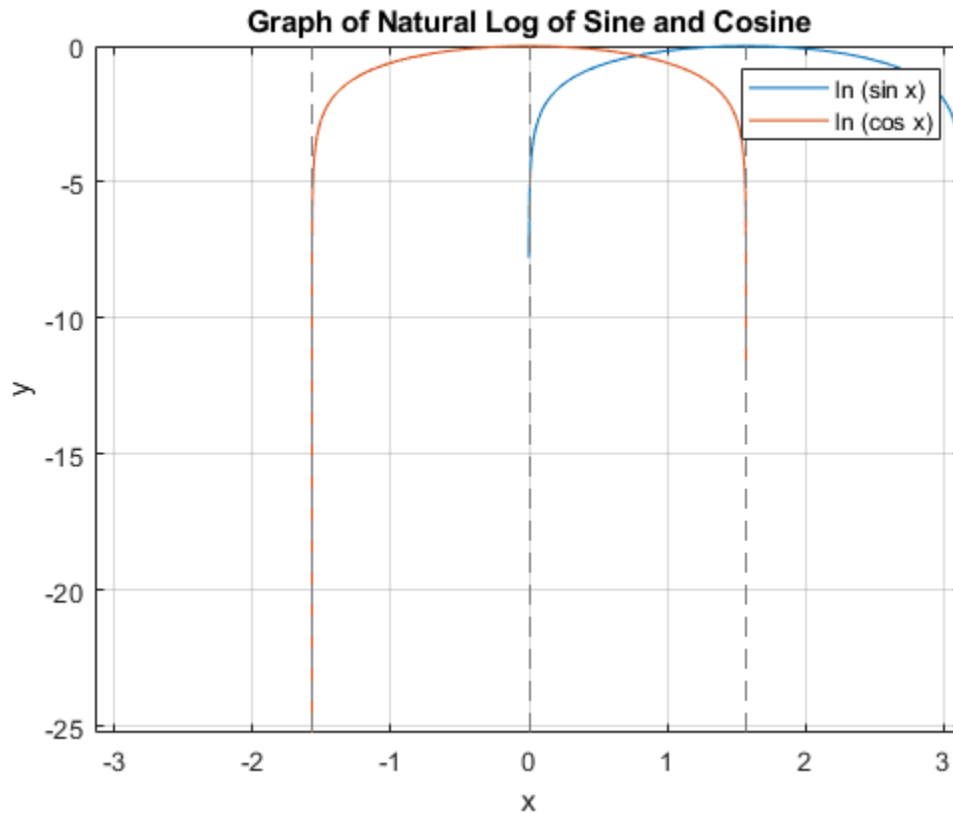
```
arc_length = int(arc_length_formula,x,(pi/4),(pi/2)); % solve the
    integral of the arc length formula with accordance to the correct
    interval
fprintf('The arc length of the curve f(x)= ln(sin x) is %.3f.\n'
    ,arc_length)
```

Zyad Khan - MATLAB Chapter 8 Assignment

The integral of $f(x) = \ln(\sin x)$ converges and the limit is -1.089.

The integral of $g(x) = \ln(\cos x)$ converges and the limit is -1.089.

The arc length of the curve $f(x) = \ln(\sin x)$ is 0.881.



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