

Calculus(II) Quiz6(05/07)

1.

Differentiate the function.

$$y = \ln \tan^2 x$$

[Solution]

$$y = \ln \tan^2 x = \ln(\tan x)^2 = 2 \ln \tan x \Rightarrow y' = 2 \frac{1}{\tan x} \sec^2 x = 2 \frac{\cos x}{\sin x} \frac{1}{\cos^2 x} = \frac{2}{\sin x \cos x} \text{ [or } 2 \csc x \sec x \text{]}$$

2.

Express the quantity as a single logarithm.

$$\frac{1}{3} \ln(x+1)^2 + \frac{1}{4} [\ln x - \ln(x^2 + 4x + 1)^2]$$

[Solution]

$$\begin{aligned} \frac{1}{3} \ln(x+1)^2 + \frac{1}{4} [\ln x - \ln(x^2 + 4x + 1)^2] &= \ln[(x+1)^2]^{1/3} + \frac{1}{4} \ln \frac{x}{(x^2+4x+1)^2} \\ &= \ln(x+1)^{2/3} + \ln \frac{x^{1/4}}{(x^2+4x+1)^{1/2}} \\ &= \ln \frac{(x+1)^{2/3} x^{1/4}}{(x^2+4x+1)^{1/2}} \end{aligned}$$