1. Use logarithmic differentiation to find the derivative of the function $y = \sqrt{e^x \sin(x) \cos(x)}$.

Use logarithmic differentiation to find the derivative of the function
$$y = \sqrt{e^x \sin(x) \cos(x)}$$
.

$$\int = \left(e^x \sin(x) \cos(x) \right)^{\frac{1}{2}} dx$$

$$\lim_{x \to \infty} |y| = \lim_{x \to \infty} \left(e^x \sin(x) \cos(x) \right)^{\frac{1}{2}} dx$$

$$\lim_{x \to \infty} |y| = \frac{1}{2} \lim_{x \to \infty} \left(e^x \sin(x) \cos(x) \right)^{\frac{1}{2}} dx$$

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$$\lim_{x \to \infty} |y| = \frac{1}{2} \lim_{x \to \infty} \left(e^x + \lim_{x \to \infty} |\sin(x)| + \lim_{x \to \infty} |\cos(x)| \right)$$

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$$ln|y| = \frac{1}{2}x + \frac{1}{2}ln|sin(x)| + \frac{1}{2}ln|cos(x)|$$

$$D_{x} \left[\ln |y| \right] = D_{x} \left[\frac{1}{2} \times + \frac{1}{2} \ln \left| \sin (x) \right| + \frac{1}{2} \ln \left| \cos (x) \right| \right]$$

$$\frac{y'}{y} = \frac{1}{2} + \frac{1}{2} \frac{\cos(x)}{\sin(x)} - \frac{1}{2} \frac{\sin(x)}{\cos(x)}$$

$$y' = y\left(\frac{1}{2} + \frac{1}{2}\frac{\cos(x)}{\sin(x)} - \frac{1}{2}\frac{\sin(x)}{\cos(x)}\right)$$

$$y' = \sqrt{\frac{e^{x} \sin(x) \cos(x)}{2}} \left(\frac{1}{2} + \frac{\cos(x)}{2 \sin(x)} - \frac{\sin(x)}{2 \cos(x)} \right)$$

$$y' = \frac{1}{2} \sqrt{e^{x} \sin(x) \cos(x)} \left(1 + \cot(x) - \tan(x)\right)$$

Name: Richard

Quiz 14 🜲

MATH 200 October 24, 2022

1. Use logarithmic differentiation to find the derivative of the function $y = x^2 e^x \sin(x) \cos(x)$.

$$y = \chi^2 e^{\chi} \sin(\chi) \cos(\chi)$$

$$|m|y| = |m|x^2 e^{x} \sin(x) \cos(x)$$

$$ln|y| = ln|x^2| + ln|e^x| + ln|sin(x)| + ln|cos(x)|$$
 $ln|y| = 2 ln|x| + x + ln|sin(x)| + ln|cos(x)|$

$$D_{x}[\ln|y|] = D_{x}[2\ln|x| + x + \ln|\sin(x)| + \ln|\cos(x)|]$$

$$\frac{y}{y} = 2\frac{1}{x} + 1 + \frac{\cos(x)}{\sin(x)} - \frac{\sin(x)}{\cos(x)}$$

$$y' = y \left(\frac{2}{x} + 1 + \frac{\cos(x)}{\sin(x)} - \frac{\sin(x)}{\cos(x)} \right)$$

$$\int_{0}^{\pi} \int_{0}^{\pi} \frac{1}{x^{2}} e^{x} \sin(x) \cos(x) \left(\frac{2}{x} + 1 + \frac{\cos(x)}{\sin(x)} - \frac{\sin(x)}{\cos(x)} \right)$$

Name: Richard

Quiz 14 \Diamond

MATH 200 October 24, 2022

1. Use logarithmic differentiation to find the derivative of the function $y = \frac{1}{e^x \sin(x) \cos(x)}$.

$$y = \frac{1}{e^{x} \sin(x) \cos(x)}$$

$$ln(y) = ln \left| \frac{1}{e^{\times} \sin(x) \cos(x)} \right|$$

ln/y/= ln/1/- ln/exsin(x) cos(x)/

ln/y = 0 - ln/ex/-ln/sin(x) - ln/cos(x)

ln|y| = -x - ln|sin(x)|-ln|cos(x)|

 $D_{x} \left[\ln |y| \right] = D_{x} \left[-x - \ln |\sin(x)| - \ln |\cos(x)| \right]$

$$\frac{y'}{y} = -1 - \frac{\cos(x)}{\sin(x)} + \frac{\sin(x)}{\cos(x)}$$

$$y' = y\left(-1 - \frac{\cos(x)}{\sin(x)} + \frac{\sin(x)}{\cos(x)}\right)$$

$$y' = \frac{1}{e^{x} \sin(x) \cos(x)} \left(-1 - \frac{\cos(x)}{\sin(x)} + \frac{\sin(x)}{\cos(x)} \right)$$

Quiz 14 🌲

Name: Richard

MATH 200 October 24, 2022

1. Use logarithmic differentiation to find the derivative of the function $y = xe^x \sin^2(x)$.

$$y = xe^{x} \sin^{2}(x)$$

$$lm|y| = lm|xe^{x} \sin^{2}(x)|$$

$$lm|y| = lm|x| + lm|e^{x}| + lm|\sin^{2}(x)|$$

$$lm|y| = lm|x| + x + 2 lm|$$

y'= (exsin(x) + xe x sin 2(x) + 2xe x sin (x) cos(x)