

Answer on question 34147 – Math – Calculus

if $y = e^{ax} \cos^3 x \sin^2 x$ find dy/dx .

Solution

As I can recognize this function, the function is

$$y = e^{ax} \cos^3 x \sin^2 x$$

Using the Product rule we get

$$y' = (e^{ax} \cos^3 x \sin^2 x)' = (e^{ax})' \cos^3 x \sin^2 x + e^{ax} (\cos^3 x)' \sin^2 x + e^{ax} \cos^3 x (\sin^2 x)' \quad (*)$$

Using chain rule we get

$$(e^{ax})' = ae^{ax}, \quad (\cos^3 x)' = 3 \cos^2 x * (\cos x)' = -3 \cos^2 x * \sin x,$$

$$(\sin^2 x)' = 2 \sin x (\sin x)' = 2 \sin x \cos x.$$

Substituting this into (*) we obtain

$$\begin{aligned} y' &= ae^{ax} \cos^3 x \sin^2 x - 3e^{ax} \cos^2 x \sin^3 x + 2e^{ax} \cos^4 x \sin x \\ &= e^{ax} \cos^2 x \sin x (\cos x \sin x - 3 \sin^2 x + 2 \cos^2 x). \end{aligned}$$

Answer: $y' = e^{ax} \cos^2 x \sin x (\cos x \sin x - 3 \sin^2 x + 2 \cos^2 x)$.