Answer on Question #34586 – Math – Calculus

If

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

Find $\frac{dy}{dx}$.

Solution

We'll use next rules

1. $\left(e^{f(x)}\right)' = e^{f(x)} \cdot f'(x)$

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

3. $(\sin x)' = \cos x$

4. $(f(x) \cdot g(x) \cdot p(x))' = f'(x) \cdot g(x) \cdot p(x) + f(x) \cdot g'(x) \cdot p(x) + f(x) \cdot g(x) \cdot p'(x)$

5. $(cx)' = c$ where $c = const$

6. $\left(f^n(x)\right)' = nf^{n-1}(x) \cdot f'(x)$

Denote

$$y' = \frac{dy}{dx}.$$

Because $a = const$ then

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

$$+e^{ax} \cdot (\cos^3 x)' \cdot \sin^2 x + e^{ax} \cdot \cos^3 x \cdot (\sin^2 x)' = ae^{ax} \cdot \cos^3 x \cdot \sin^2 x +$$

$$+e^{ax} \cdot 3\cos^2 x \cdot (-\sin x) \cdot \sin^2 x + e^{ax} \cdot \cos^3 x \cdot 2\sin x \cdot \cos x =$$

$$= e^{ax} \cdot \cos^2 x \cdot \sin x \cdot (a \cdot \cos x \cdot \sin x - 3\sin^2 x + 2\cos^2 x).$$

Answer:

$$\frac{dy}{dx} = e^{ax} \cdot \cos^2 x \cdot \sin x \cdot (a \cdot \cos x \cdot \sin x - 3\sin^2 x + 2\cos^2 x)$$