Answer on Question# 37556 – Math - Other

If y = e^ax cos^3x sin^2x find dy/dx

Solution. Using twice the product rule of differentiation $(fg)' = f'g + fg'$, we have

$$\frac{dy}{dx} = y' = (e^{ax}\cos^3 x \sin^2 x)' = (e^{ax}\cos^3 x)' \sin^2 x + e^{ax}\cos^3 x\,(\sin^2 x)' =$$
$$= [(e^{ax})'\cos^3 x + e^{ax}(\cos^3 x)'] \sin^2 x + e^{ax}\cos^3 x\,(\sin^2 x)'.$$

Finally, by the chain rule $h'(x) = f'\big(g(x)\big)g'(x)$, we obtain

$$\frac{dy}{dx} = [ae^{ax}\cos^3 x + 3e^{ax}\cos^2 x\,(-\sin x)]\sin^2 x + 2e^{ax}\cos^3 x \sin x \cos x = ae^{ax}\cos^3 x \sin^2 x$$
$$+ e^{ax}(2\cos^4 x \sin x - 3\cos^2 x \sin^3 x).$$

Answer. $ae^{ax}\cos^3 x \sin^2 x + e^{ax}(2\cos^4 x \sin x - 3\cos^2 x \sin^3 x)$.