Answer on Question #64250 – Math – Differential Equations

Question

If $y = e^{ax}\cos(3x)\sin(2x)$ find $\frac{dy}{dx}$

Solution

Recall the following formulae:

$$(uv)' = u'v + uv'$$

$$\big(f(g(x))\big)' = f'(g(x)) \cdot g'(x)$$

$$(e^x)' = e^x$$

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

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

$$(ax)' = a$$

Then

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

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

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

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