

Group Exercises

Find the following derivatives using the differentiation rules:

(1) $(x^2 e^x)'$

(2) $\left(\frac{x}{e^x}\right)'$

(3) $\left(\frac{x}{e^x}\right)''$

Group Exercises Solutions

Find the following derivatives using the differentiation rules:

$$(1) (x^2 e^x)' = (x^2)'e^x + x^2(e^x)' = 2xe^x + x^2e^x = (2x + x^2)e^x$$

$$(2) \left(\frac{x}{e^x}\right)' = \frac{(x)'e^x - x(e^x)'}{(e^x)^2} = \frac{e^x - xe^x}{(e^x)^2} = \frac{1-x}{e^x}$$

$$(3) \left(\frac{x}{e^x}\right)'' = \left(\left(\frac{x}{e^x}\right)'\right)' = \left(\frac{1-x}{e^x}\right)' = \frac{(1-x)'e^x - (1-x)(e^x)'}{(e^x)^2} = \frac{-e^x - (1-x)e^x}{(e^x)^2} = \frac{-1 - (1-x)}{e^x} = \frac{x-2}{e^x}$$