Questions: The product rule

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Summary

A selection of questions for the study guide on the product rule.

Before attempting these questions, it is highly recommended that you read Guide: The product rule..

In this question set, the following definitions are used:

$$\cosh(x) = \frac{e^x + e^{-x}}{2} \quad \text{and} \quad \sinh(x) = \frac{e^x - e^{-x}}{2}$$

These are **hyperbolic trigonometric functions**; for more about these, see [Guide: Introduction to hyperbolic functions].

Differentiate the following functions using the product rule.

1.1. xe^x

1.2. x^2e^{2x}

1.3. $5x^3 \tan(x) \cos(x)$

1.4. $x \ln(x)$

1.5. $(x^3 + x^2 - 5)(x + 1)$

1.6. $(13x^2 + 5x + 2)(x^3 + 2)$

1.7. $x(5x^2 + 3x + 2)(x^2 + x + 1)$

1.8. $(10x^2 + 21) \cos(x)$

1.9. $\cosh(2x) \sinh(3x)$

1.10 $(x^2 + 3) \ln(x)$

1.11 $\sin(x)\sqrt{x}$

1.12 $\cosh(x) \ln(x)$

1.13. $x^2\sqrt{x} + x^2 \cos(x)$

1.14. $e^{-5x}(x^3 + 5)$

1.15. $\cos(x) \ln(x)$

1.16. $\ln(x)\ln(3x)\ln(100x)$

1.17. $(x^2+5x+2)\sin(x)$

1.18. $-\ln(x)\ln(3x)$

1.19. $(x^5+3)(x^2+3x)(x^7+x^4)$

1.20. $(\sin(x)+3x)e^{-x}$

After attempting the questions above, please click this link to find the answers.

Version history and licensing

v1.0: initial version created 05/25 by Sara Delgado Garcia as part of a University of St Andrews VIP project.