

# Questions: Introduction to differentiation and the derivative

Sara Delgado Garcia

## Summary

A selection of questions for the study guide on introduction to differentiation and the derivative.

*Before attempting these questions, it is highly recommended that you read [Guide: Introduction to differentiation and the derivative](#).*

In this guide, 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].

Using the differentiation rules seen in [Guide: Introduction to differentiation and the derivative](#), differentiate the following functions:

1.1.  $x^3 + 5x - 3$

1.2.  $5x$

1.3.  $-5\sqrt{x}$

1.4.  $-\sin(x)$

1.5.  $\cos(x) + 5$

1.6.  $2\sqrt{x}$

1.7.  $2\ln(2x) + x^5$

1.8.  $\ln(5x)$

1.9.  $e^{-x}$

1.10.  $23x + 5$

1.11.  $4x + 100$

1.12.  $\sinh(5x)$

1.13.  $\cos(3x) - \sin(2x)$

1.14  $\ln(x) + \cos(x) + 3x$

1.15.  $\frac{2}{5} \sinh(x) + \frac{2}{13} \cosh(x)$

1.16.  $e^{5x} + x^2 + 3$

1.17.  $\ln(x) + x^2$

1.18.  $\ln(5x) - \ln(x)$

1.19.  $\cosh(x) - 5x^7$

1.20.  $\sqrt{3x^2}$

1.21.  $x^3 + 3x - \sqrt{2x}$

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[After attempting the questions above, please click this link to find the answers.](#)

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## Version history and licensing

v1.0: initial version created 03/25 by Sara Delgado Garcia as part of a University of St Andrews VIP project.

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