

Section 2: Natural logarithms and exponentials

Exercise level 3 (Extension)

- Sketch $y = e^x$ and $y = 4e^{-x}$ on the same graph.
 - Find the exact coordinates of their point of intersection.
 - Repeat (i) and (ii) for $y = \ln x$ and $y = 2\ln(x-1)$.
- Express 10^x in the form $e^{x \ln a}$, for a suitable constant a .
 - Prove that $\ln x = \frac{\log x}{\log e}$, where $\log x$ means logarithms in base 10.
- Simplify $\ln(\ln x^e) - \ln(\ln x)$
 - Solve the equation $e^{\ln x} + \ln e^x = 3$.
 - Solve the equation $e^{2 \ln x} + 2 \ln e^x = 3$.
- Show that $2x-1$ is a factor of $2x^3 - x^2 - 8x + 4$.
 - Hence, or otherwise, solve the equation $2e^{3x} - e^{2x} - 8e^x + 4 = 0$, giving all roots as multiples of $\ln 2$.