Marked example 3

Paper 2 style · Graphic display calculator

3 5 marks SL 2.9 · 2.11 ●●○ Typical

Let $f(x) = \ln x$, for $x > 0$, and $g(x) = \ln(x+3) - 1$, for $x > -3$.

(a) Write down the equation of the vertical asymptote of the graph of g. **[1]**

(b) Find the x-coordinate of the point where the graphs of f and g intersect. **[2]**

(c) Describe the transformation that maps the graph of f onto the graph of g. **[2]**

MARKSCHEME (a)

$x = -3$ **A1**

Total 1 mark

MARKSCHEME (b)

$\ln x = \ln(x+3) - 1$ **(M1)**

$x = 1.75 \quad (1.74593\ldots)$ **A1**

Total 2 marks

Note Exactly $\frac{3}{e-1}$.

MARKSCHEME (c)

translation 3 units to the left **A1**

and 1 unit down **A1**

Total 2 marks

Note Accept translation by the vector $\begin{pmatrix} -3 \\ -1 \end{pmatrix}$ for A1A1.

Written and verified by a practising IB mathematics teacher, produced with AI assistance; solved twice and recomputed by software.
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