Marked example 3

Paper 2 style · Graphic display calculator

3 7 marks AHL 1.11 ●●○ Typical

Let $f(x) = \dfrac{5x+3}{(x+3)(x-1)}$, for $x > 1$.

(a) Express $f(x)$ in partial fractions. **[2]**

(b) Find the exact area of the region enclosed by the graph of f, the x-axis and the lines $x = 2$ and $x = 4$, giving your answer in the form $\ln \frac{p}{q}$, where $p, q \in \mathbb{Z}^+$. **[3]**

(c) The area enclosed by the graph of f, the x-axis and the lines $x = 2$ and $x = k$ is 2. Find the value of k. **[2]**

MARKSCHEME (a)

$f(x) = \dfrac{3}{x+3} + \dfrac{2}{x-1}$ **A1A1**

Total 2 marks

MARKSCHEME (b)

$[3\ln(x+3) + 2\ln(x-1)]_2^4 = 3\ln 7 + 2\ln 3 - 3\ln 5$ **M1A1**

$= \ln \frac{3087}{125}$ **A1**

Total 3 marks

MARKSCHEME (c)

$3\ln \frac{k+3}{5} + 2\ln(k-1) = 2$ **(M1)**

$k = 3.04$ **A1**

Total 2 marks

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