Exercise 3

Paper 2 style · Graphic display calculator

3 7 marks AHL 1.11 ●●○ Typical

Let $f(x) = \dfrac{7x+1}{(x+1)(x-2)}$, for $x > 2$.

(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 $x = 3$ and $x = 5$, 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 $x = 3$ and $x = k$ is 3. Find the value of k. **[2]**

The markscheme is on the next page: try the question first. Written and verified by a practising IB mathematics teacher, produced with AI assistance; solved twice and recomputed by software. Not affiliated with or endorsed by the International Baccalaureate Organization.
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MARKSCHEME (a)

$f(x) = \dfrac{2}{x+1} + \dfrac{5}{x-2}$ **A1A1**

Total 2 marks

MARKSCHEME (b)

$[2\ln(x+1) + 5\ln(x-2)]_3^5 = 2\ln 6 + 5\ln 3 - 2\ln 4$ **M1A1**

$= \ln \frac{2187}{4}$ **A1**

Total 3 marks

MARKSCHEME (c)

$2\ln \frac{k+1}{4} + 5\ln(k-2) = 3$ **(M1)**

$k = 3.71$ **A1**

Total 2 marks