Exercise 1

Paper 1 style · No calculator

1 7 marks AHL 2.13 ●●○ Typical

Let $f(x) = \dfrac{x^2 + 2x + 5}{x + 1}$, for $x \neq -1$.

(a) Write $f(x)$ in the form $x + a + \dfrac{b}{x+1}$, where $a, b \in \mathbb{Z}$. **[2]**

(b) Write down the equations of the asymptotes of the graph of f. **[2]**

(c) Find the coordinates of the stationary points of the graph of f. **[3]**

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)

$x^2 + 2x + 5 = (x+1)(x+1) + 4$ **(M1)**

$f(x) = x + 1 + \dfrac{4}{x+1}$ **A1**

Total 2 marks

MARKSCHEME (b)

$x = -1$ **A1**

$y = x + 1$ **A1**

Total 2 marks

MARKSCHEME (c)

$f'(x) = 1 - \dfrac{4}{(x+1)^2} = 0$ **M1**

$x + 1 = \pm 2$: $x = 1$ or $x = -3$ **(A1)**

$(1, 4)$ and $(-3, -4)$ **A1**

Total 3 marks