Exercise 3

Paper 2 style · Graphic display calculator

3 7 marks AHL 2.13 ●●○ Typical

Let $h(x) = \dfrac{3x^2 + 2x - 7}{x + 1}$, for $x \neq -1$.

(a) Find the equations of the asymptotes of the graph of h. **[3]**

(b) Find the x-coordinates of the points where the graph of h meets the line $y = x + 4$. **[2]**

(c) Show that $h'(x) > 0$ for all $x \neq -1$. **[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.
© 2026 Hence

Exercise 3 — markscheme

Paper 2 style · Graphic display calculator

3 7 marks AHL 2.13 ●●○ Typical

Let $h(x) = \dfrac{3x^2 + 2x - 7}{x + 1}$, for $x \neq -1$.

(a) Find the equations of the asymptotes of the graph of h. **[3]**

(b) Find the x-coordinates of the points where the graph of h meets the line $y = x + 4$. **[2]**

(c) Show that $h'(x) > 0$ for all $x \neq -1$. **[2]**

MARKSCHEME (a)

$3x^2 + 2x - 7 = (x + 1)(3x - 1) - 6$ **(M1)**

$x = -1$ **A1**

$y = 3x - 1$ **A1**

Total 3 marks

MARKSCHEME (b)

-1.71 and 3.21 **A1A1**

Total 2 marks

Note Exact values $\frac{3 \pm \sqrt{97}}{4}$.

MARKSCHEME (c)

$h(x) = 3x - 1 - \dfrac{6}{x + 1}$, $h'(x) = 3 + \dfrac{6}{(x + 1)^2}$ **M1**

both terms positive, so $h'(x) > 0$ **R1**

Total 2 marks

Note AG.