Exercise 3

Paper 2 style · Graphic display calculator

3 5 marks SL 5.5 ●●○ Typical

The function f is defined for $x \geq 0$, with $f(0) = 1$ and $f'(x) = \sqrt{1 + x^3}$.

(a) Find $f(2)$. **[3]**

(b) Write down the gradient of the graph of f at $x = 2$. **[1]**

(c) Explain why f is increasing for $x \geq 0$. **[1]**

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)

$f(2) = f(0) + \int_0^2 \sqrt{1 + x^3}\,\mathrm{d}x$ **M1**

$= 1 + 3.24130\ldots$ **(A1)**

$f(2) = 4.24$ **A1**

Total 3 marks

MARKSCHEME (b)

$f'(2) = \sqrt{9} = 3$ **A1**

Total 1 mark

MARKSCHEME (c)

$f'(x) = \sqrt{1 + x^3} > 0$ for $x \geq 0$ **R1**

Total 1 mark