Exercise 1

Paper 1 style · No calculator

1 5 marks AHL 2.14 ●○○ Routine

Let $f(x) = x^5 - 2x^3$ and $g(x) = e^x + e^{-x}$, for $x \in \mathbb{R}$.

(a) Show that f is an odd function. **[2]**

(b) Show that g is an even function. **[1]**

(c) Hence determine whether the function $h(x) = f(x)\,g(x)$ is odd, even or neither, justifying your answer. **[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)

$f(-x) = (-x)^5 - 2(-x)^3 = -x^5 + 2x^3$ **M1**

$= -\left(x^5 - 2x^3\right) = -f(x)$ **A1**

Total 2 marks

Note AG.

MARKSCHEME (b)

$g(-x) = e^{-x} + e^x = g(x)$ **A1**

Total 1 mark

MARKSCHEME (c)

$h(-x) = f(-x)g(-x) = -f(x)g(x) = -h(x)$ **M1**

h is odd **A1**

Total 2 marks