Marked example 1

Paper 1 style · No calculator

1 5 marks AHL 2.14 ●○○ Routine

Let $f(x) = x^3 - 4x$ and $g(x) = x^2 + \cos x$, 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]**

MARKSCHEME (a)

$f(-x) = (-x)^3 - 4(-x) = -x^3 + 4x$ **M1**

$= -\left(x^3 - 4x\right) = -f(x)$ **A1**

Total 2 marks

Note AG.

MARKSCHEME (b)

$g(-x) = (-x)^2 + \cos(-x) = x^2 + \cos x = g(x)$ **A1**

Total 1 mark

Note $\cos(-x) = \cos x$ seen.

MARKSCHEME (c)

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

h is odd **A1**

Total 2 marks

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