Marked example 3

Paper 1 style · No calculator

3 7 marks SL 5.10 ●●○ Typical

Let $h(x) = e^{x^2}$.

(a) Find $h'(x)$. **[2]**

(b) Hence find $\int x e^{x^2} \, dx$. **[2]**

(c) The function g satisfies $g'(x) = x e^{x^2}$ and $g(0) = \frac{3}{2}$. Find $g(x)$. **[3]**

MARKSCHEME (a)

chain rule: $h'(x) = e^{x^2} \times 2x$ **M1**

$h'(x) = 2x e^{x^2}$ **A1**

Total 2 marks

MARKSCHEME (b)

$\int 2x e^{x^2} \, dx = e^{x^2} + c$ **(M1)**

$\int x e^{x^2} \, dx = \frac{1}{2} e^{x^2} + c$ **A1**

Total 2 marks

Note The integrand is half of $h'(x)$: halve the antiderivative.

MARKSCHEME (c)

$g(x) = \frac{1}{2} e^{x^2} + c$ **M1**

$\frac{1}{2} e^0 + c = \frac{3}{2}$, $c = 1$ **A1**

$g(x) = \frac{1}{2} e^{x^2} + 1$ **A1**

Total 3 marks

Written and verified by a practising IB mathematics teacher, produced with AI assistance; solved twice and recomputed by software.
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