Solutions

Marking: **M1** a correct method, **A1** the correct answer, **B1** an independent mark.

Each answer shows the steps, then the **result**.

2.1

$5(3x+1)^4 \times 3 = \mathbf{15(3x+1)^4}$

2.2

$u' = 2x$, $v' = 3e^{3x}$; $2xe^{3x} + 3x^2e^{3x} = \mathbf{xe^{3x}(2+3x)}$

2.3

$$\frac{\frac{1}{x}\cdot x - \ln x \cdot 1}{x^2} = \frac{\mathbf{1 - \ln x}}{\mathbf{x^2}}$$

2.4

$2x\cos(x^2)$; $2\sqrt{\pi}\cos\pi = \mathbf{-2\sqrt{\pi}}$ (-3.54)

3.1

(a) $(t-2)(t-4) = 0$; $t = \mathbf{2}$ and $\mathbf{4}$ s

(b) $a = 2t - 6$; $a = \mathbf{-4}$ m s^{-2}

(c) $s = \frac{t^3}{3} - 3t^2 + 8t$; $s(3) = \mathbf{6}$ m

(d) $\int_0^5 |v|\,dt$; $\frac{20}{3} + \frac{4}{3} + \frac{4}{3} = \mathbf{\frac{28}{3}}$ (9.33) m

3.2

(a) product rule: $1 \cdot e^{-x} + x \cdot (-e^{-x})$; $= e^{-x}(1-x)$

(b) $x = 1$; $\left(\mathbf{1}, \mathbf{\frac{1}{e}}\right)$

(c) $-e^{-x}(1-x) + e^{-x}(-1)$; $= e^{-x}(x-2)$

(d) $x = 2$, and f'' changes sign there (R1); $\left(\mathbf{2}, \mathbf{\frac{2}{e^2}}\right)$

(e) $f'(0) = 1$; $\mathbf{y = x}$

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