

1	Use identity to express integrand in the form $k_1 + k_2 \cos 2x$
	Obtain correct $3 - 3\cos 2x$
	Integrate to obtain $3x - \frac{3}{2}\sin 2x$
5(a)	Attempt solution of $8e^{-\frac{1}{2}x} - 1 = 0$ with use of a relevant logarithm property
	Confirm $x = 6\ln 2$
	Alternative Method for Question 5(a)
	Substitute $x = 6\ln 2$ in $8e^{-\frac{1}{2}x} - 1$ and show use of a relevant logarithm property
	Obtain $8e^{-3\ln 2} - 1$ and hence $8e^{\ln \frac{1}{8}} - 1$ or equivalent and verify answer 0
5(b)	Integrate $8e^{-\frac{1}{2}x} - 1$ to obtain the form $ke^{-\frac{1}{2}x} - x$
	Obtain correct $-16e^{-\frac{1}{2}x} - x$
	Apply limits 0 and $6\ln 2$ to obtain $-16e^{-\frac{1}{2} \times 6\ln 2} - 6\ln 2 + 16$
	Attempt area of triangle minus area under curve
	Obtain $\frac{1}{2} \times 6\ln 2 \times 7 - (14 - 6\ln 2)$ or equivalent, and hence $27\ln 2 - 14$

5(a)	Differentiate to obtain $-8\sin 2x + 8\cos x$
	Attempt to solve equation of form $k_1 \sin 2x + k_2 \cos x = 0$ using correct identity
	Obtain at least $\sin x = \frac{1}{2}$
	Attempt to find both coordinates of at least one maximum point
	Obtain $(\frac{1}{6}\pi, 6)$ and $(\frac{5}{6}\pi, 6)$ and no others between 0 and π
5(b)	Integrate to obtain expression of form $k_1 \sin 2x + k_2 \cos x$
	Obtain correct $2\sin 2x - 8\cos x$
	Apply <i>their</i> x -limits correctly to evaluate area under curve between A and B
	Obtain $6\sqrt{3}$ or exact unsimplified equivalent
	Carry out correct process to find area of shaded region
	Obtain $6(\frac{5}{6}\pi - \frac{1}{6}\pi) - 6\sqrt{3}$, and hence $4\pi - 6\sqrt{3}$

6(a)	Integrate to obtain expression of form $k_1e^{2x} + k_2e^{-x}$
	Obtain correct $\frac{1}{4}e^{2x} - \frac{1}{4}e^{-x}$
	Apply limits and arrange at least as far as $\frac{1}{2}e^{2a} = \dots$ or $e^{2a} = \dots$
	Confirm $a = \frac{1}{2}\ln(10 + \frac{1}{2}e^{-a} + \frac{1}{2}e^{-4a})$
6(b)	Consider sign of $a - \frac{1}{2}\ln(10 + \frac{1}{2}e^{-a} + \frac{1}{2}e^{-4a})$ or equivalent for values 1.0 and 1.2
	Obtain $-0.16\dots$ and $0.041\dots$ or equivalents and justify conclusion
6(c)	Use iteration process correctly at least once
	Obtain final answer 1.159
	Show sufficient iterations to justify answer or show a sign change in the interval $[1.1585, 1.1595]$

4(a)	Differentiate to obtain $12e^{2x} - 3e^{3x}$
	Attempt solution for x of equation of form $k_1e^{2x} + k_2e^{3x} = 0$ (but not for $y = 0$), to obtain $e^{\pm x} = k$
	Obtain $x = \ln 4$ or $x = 2\ln 2$
4(b)	Identify $x = \ln 6$ as point where curve meets x -axis
	Integrate to obtain the form $k_3e^{2x} + k_4e^{3x}$
	Obtain $3e^{2x} - \frac{1}{3}e^{3x}$
	Apply limits to obtain answer $\frac{100}{3}$ only
7(a)	Use correct identities to express in terms of $\sin x$ and $\cos x$
	Obtain $4\sin^2 x \cos^2 x + 4\cos^2 x(\cos^2 x - \sin^2 x)$
	Confirm $4\cos^4 x$
7(b)	Use identity from part (a) to obtain $k < 5$ or $k > 9$
	Obtain $k < 5, k > 9$
7(c)	State or imply integrand is $2\cos^2 \frac{1}{2}t$ or $\sqrt{4\cos^4 \frac{t}{2}}$
	Use double-angle identity to express in terms of $\cos t$
	Obtain $1 + \cos t$ and integrate to obtain $t + \sin t$
	Use limits to obtain $\frac{2}{3}\pi + \sqrt{3}$

1	Integrate to obtain $2\ln(4x + 1)$
	Apply limits correctly to $k\ln(4x + 1)$ and use at least one relevant logarithm property
	Obtain $2\ln 45 - 2\ln 9 = 2\ln 5$ or equivalent, and conclude $\ln 25$
4(a)	State $4e^{-2x} = 1 + 0.5\sin 3x$ and confirm $x = -0.5\ln(0.25 + 0.125\sin 3x)$
4(b)	Use iterative process correctly at least once
	Obtain final answer 0.4912
	Show sufficient iterations to 6 significant figures to justify answer or show a sign change in the interval $[0.49115, 0.49125]$
4(c)	Integrate to obtain the form $k_1e^{-2x} + k_2x + k_3\cos 3x$
	Obtain correct $-2e^{-2x} - x + \frac{1}{6}\cos 3x$
	Apply limits 0 and <i>their</i> part (b) answer correctly and attempt evaluation
	Obtain 0.61