1 Find $\int 6\sin^2 x\,dx$. [3]

2 Solve the equation $e^{2x}(e^{2x} - 8) = 48$. [3]

3 **(a)** Solve the equation $|2x-3|=|5x+2|$. [3]

(b) Hence solve the equation $|2\sec\theta-3|=|5\sec\theta+2|$ for $\pi<\theta<2\pi$. Give your answer correct to 3 significant figures. [3]

4 Solve the equation $\cot\theta\tan(\theta+45°)=7$ for $0°<\theta<90°$. [5]

6 A curve has parametric equations

$$x = \tan\theta, \quad y = \sin\theta - 2\sin^3\theta,$$

for $0 < \theta < \frac{1}{2}\pi$.

(a) Show that $\dfrac{dy}{dx} = 6\cos^5\theta - 5\cos^3\theta$. [4]

(b) Find the equation of the normal to the curve at the point where it crosses the x-axis. Give your answer in the form $y = mx + c$, where m and c are exact constants. [5]

3 **(a)** Sketch, on a single diagram, the graphs of $y = 3e^{-2x}$ and $y = \sec x$ for values of x such that $0 \leqslant x < \frac{1}{2}\pi$. [2]

(b) Show that the x-coordinate of the point of intersection of the two graphs satisfies the equation $x = \frac{1}{2}\ln(3\cos x)$. [2]

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(c) Use an iterative formula, based on the equation in part **(b)**, to find the x-coordinate of the point of intersection correct to 3 decimal places. Give the result of each iteration to 5 decimal places. [3]

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