

[3]

[3]

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

[illegible]

(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]

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and extend across the width of the page. At the bottom center, there is a small circle containing the number 3.

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

[illegible]

**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  $\frac{dy}{dx} = 6 \cos^5 \theta - 5 \cos^3 \theta$ .

[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]

[5]

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

[illegible]

- (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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