AS · CIE · Maths

50 mins 10 questions

Practice Paper 2 (Pure 2)

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Total Marks	/50

Solve the equation

1

$$\log_x(5x - 6) = 2.$$

(3 marks)

$$f(x) = 6x^4 + 7x^3 - 27x^2 - 28x + 12$$

2 (a)

(a) Find the remainder when $f(x)$ is divided by $(2x + 3)$.

(2 marks)

(b) (b) Given that $(x + 2)$ is a factor of $f(x)$, factorise $f(x)$ completely.

(5 marks)

3 (a) (a) Integrate

$$\int \cos 2x \ \mathrm{d}x$$

(2 marks)

(b) (b) Use calculus to find the value of

$$\int_0^2 (3x-1)^3 \ \mathrm{d}x$$

(4 marks)

4 Solve the equation $|x^2 - 9| = 6 - 0.25x^2$, giving your answers in exact form.

(3 marks)

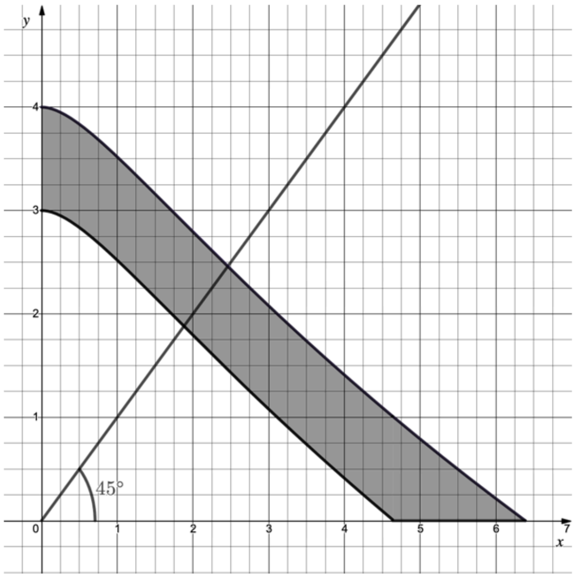
The game of Logball is played on a flat table.
A player rolls a ball from a fixed point, at any angle, with the aim of it coming to rest within a winning zone.

A particular player decides to roll the ball at an angle of 45°, as illustrated in the graph below, with the ball being rolled from the origin and the shaded area being the winning zone.

The lower boundary of the winning zone has equation $y = 3 - \ln(x+1)^2 \quad x, y \geq 0$

The upper boundary of the winning zone has equation $y = 4 - \ln(x+1)^2 \quad x, y \geq 0$

5 (a)



(a) Using an appropriate iterative formula with initial value $x_0 = 1.8$, find the minimum distance this player's ball needs to travel to stop within the winning zone. Give your answer to two significant figures.

(3 marks)

(b)

(b) Using another iterative formula with initial value $x_0 = 2.5$, find the maximum distance this player's ball can travel yet remain within the winning zone.
Give your answer to two significant figures.

(3 marks)

6 (a) (a) Express $\cos(285°)$ in terms of cosines and sines of $315°$ and $30°$.

(2 marks)

(b) (b) Hence show that $\cos(285°) = \frac{\sqrt{6}-\sqrt{2}}{4}$.

(3 marks)

Find an expression for $\frac{dy}{dx}$ in terms of t for the parametric equations

$$x = e^{2t} \qquad y = 3t^2 + 1$$

7 **(3 marks)**

8 (a) (a) Show that $6\cos\theta - 8\sin\theta$ can be written in the form $R\cos(\theta + \alpha)$, where $R > 0$ and α is an acute angle measured in radians.

(3 marks)

(b) (b) Hence, or otherwise, solve the equation $3\cos\theta - 4\sin\theta - 2 = 0$, for $0 \leq x \leq 2\pi$. Give your answers to three significant figures.

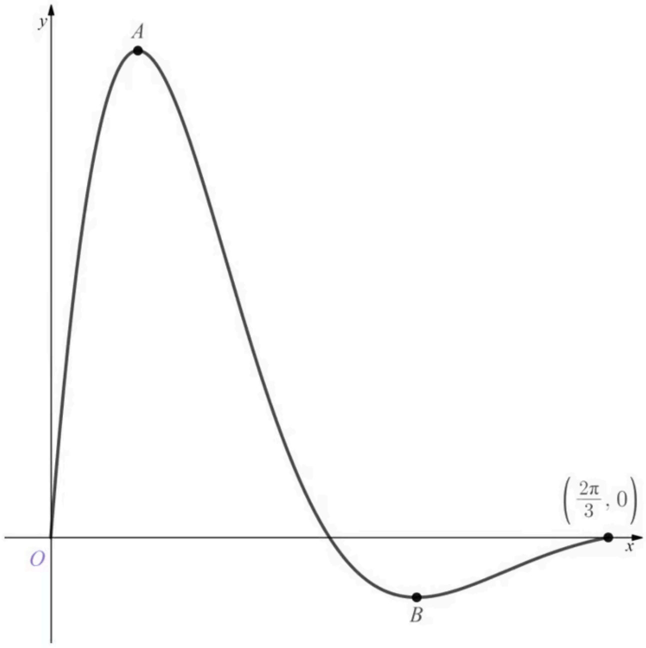
(3 marks)

(c) (c) Write down the minimum value of $6\cos\theta - 8\sin\theta$ and the smallest positive value of θ for which it occurs. Give your value of θ to three significant figures.

(2 marks)

9 The diagram below shows the graph of $y = \mathrm{f}(x)$, where $\mathrm{f}(x)$ is the function defined by

$$\mathrm{f}(x) = \frac{\sin 3x}{e^{2x-3}}, \qquad 0 \leq x \leq \frac{2\pi}{3}$$



The points A and B are maximum and minimum points, respectively.

Find the range of $\mathrm{f}(x)$, giving your answer correct to 3 decimal places.

(6 marks)

10 When $x^3 + ax^2 + 4x - 1$ is divided by $x + 2$ the quotient is $x^2 - 4x + 12$ and the remainder is b.
Find the values of a and b.

(3 marks)