UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Advanced Subsidiary Level

**MATHEMATICS** **9709/22**

Paper 2 Pure Mathematics 2 **(P2)** **October/November 2012**

**1 hour 15 minutes**

Additional Materials: Answer Booklet/Paper
Graph Paper
List of Formulae (MF9)

*6984570446*

**READ THESE INSTRUCTIONS FIRST**

If you have been given an Answer Booklet, follow the instructions on the front cover of the Booklet.
Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
You may use a soft pencil for any diagrams or graphs.
Do not use staples, paper clips, highlighters, glue or correction fluid.

Answer **all** the questions.
Give non-exact numerical answers correct to 3 significant figures, or 1 decimal place in the case of angles in degrees, unless a different level of accuracy is specified in the question.
The use of an electronic calculator is expected, where appropriate.
You are reminded of the need for clear presentation in your answers.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.
The total number of marks for this paper is 50.
Questions carrying smaller numbers of marks are printed earlier in the paper, and questions carrying larger numbers of marks later in the paper.

This document consists of **3** printed pages and **1** blank page.

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UNIVERSITY of CAMBRIDGE International Examinations

**1** Solve the inequality $|2x + 1| < |2x - 5|$. [3]

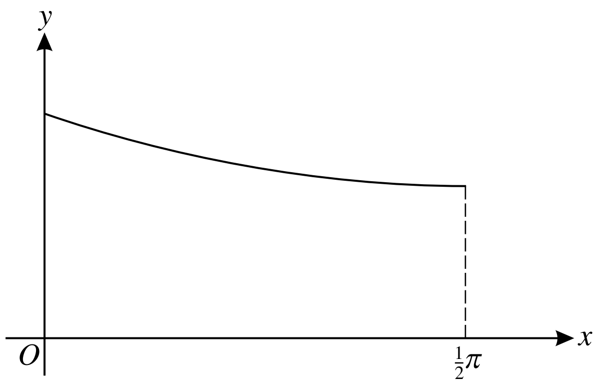
**2** The curve with equation $y = \dfrac{\sin 2x}{e^{2x}}$ has one stationary point in the interval $0 \leqslant x \leqslant \frac{1}{2}\pi$. Find the exact $x$-coordinate of this point. [4]

**3** The polynomial $x^4 - 4x^3 + 3x^2 + 4x - 4$ is denoted by $p(x)$.

**(i)** Find the quotient when $p(x)$ is divided by $x^2 - 3x + 2$. [3]

**(ii)** Hence solve the equation $p(x) = 0$. [3]

**4**




The diagram shows the part of the curve $y = \sqrt{(2 - \sin x)}$ for $0 \leqslant x \leqslant \frac{1}{2}\pi$.

**(i)** Use the trapezium rule with 2 intervals to estimate the value of

$$\int_0^{\frac{1}{2}\pi} \sqrt{(2 - \sin x)}\, dx,$$

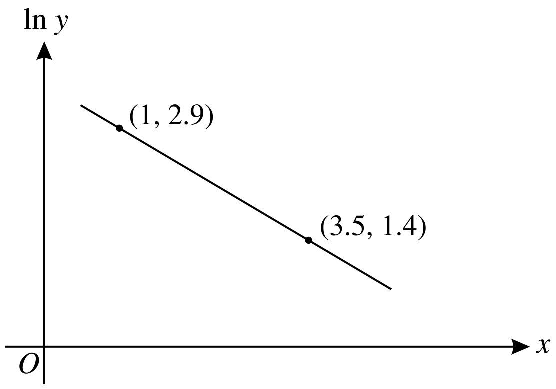
giving your answer correct to 2 decimal places. [3]

**(ii)** The line $y = x$ intersects the curve $y = \sqrt{(2 - \sin x)}$ at the point $P$. Use the iterative formula

$$x_{n+1} = \sqrt{(2 - \sin x_n)}$$

to determine the $x$-coordinate of $P$ correct to 2 decimal places. Give the result of each iteration to 4 decimal places. [3]

**5**




The variables $x$ and $y$ satisfy the equation $y = A(b^{-x})$, where $A$ and $b$ are constants. The graph of $\ln y$ against $x$ is a straight line passing through the points (1, 2.9) and (3.5, 1.4), as shown in the diagram. Find the values of $A$ and $b$, correct to 2 decimal places. [6]

**6** **(a)** Find $\int 4e^{-\frac{1}{2}x}\,dx$. [2]

**(b)** Show that $\int_1^3 \frac{6}{3x-1}\,dx = \ln 16$. [5]

**7** The equation of a curve is

$$3x^2 - 4xy + 2y^2 - 6 = 0.$$

**(i)** Show that $\frac{dy}{dx} = \frac{3x-2y}{2x-2y}$. [4]

**(ii)** Find the coordinates of each of the points on the curve where the tangent is parallel to the $x$-axis. [5]

**8** **(a)** Given that $\tan A = t$ and $\tan(A + B) = 4$, find $\tan B$ in terms of $t$. [3]

**(b)** Solve the equation

$$2\tan(45° - x) = 3\tan x,$$

giving all solutions in the interval $0° \leqslant x \leqslant 360°$. [6]

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