CAMBRIDGE INTERNATIONAL EXAMINATIONS

General Certificate of Education Advanced Subsidiary Level

MATHEMATICS **8709/2**

PAPER 2 Pure Mathematics 2 **(P2)**

OCTOBER/NOVEMBER SESSION 2001 1 hour 15 minutes

Additional materials:
- Answer paper
- Graph paper
- List of Formulae (MF9)

TIME 1 hour 15 minutes

INSTRUCTIONS TO CANDIDATES

Write your name, Centre number and candidate number in the spaces provided on the answer paper/answer booklet.

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.

INFORMATION FOR CANDIDATES

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.

The use of an electronic calculator is expected, where appropriate.

You are reminded of the need for clear presentation in your answers.

This question paper consists of 3 printed pages and 1 blank page.

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1 Solve the equation $2\sec^2 x - \tan x = 5$, for $0° \leqslant x \leqslant 360°$. [5]

2 (i) By using the substitution $u = 2^x$, show that the equation $4^x = 2^{x+1} + 12$ can be expressed as $u^2 - 2u - 12 = 0$. [1]

(ii) Hence find x, correct to 2 decimal places. [4]

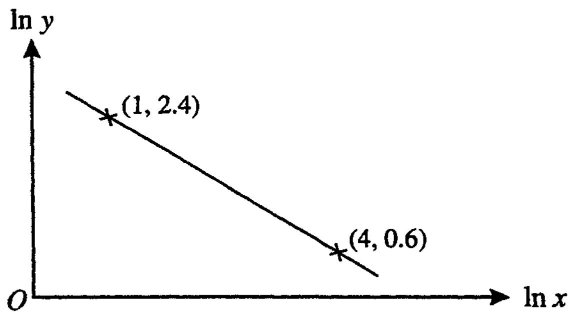
3 (i) Sketch the graphs of $2y = x + 1$ and $2y = |x - 4|$ on the same diagram. [3]

(ii) Solve the simultaneous equations

$$2y = x + 1,$$
$$2y = |x - 4|.$$

[3]

4



Variables x and y are related by the equation

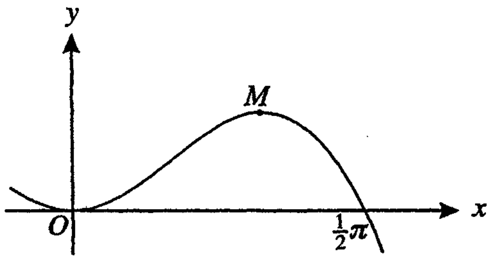
$$y = Ax^n,$$

where A and n are constants. When a graph of $\ln y$ against $\ln x$ is drawn, the resulting line passes through the points (1, 2.4) and (4, 0.6), as shown in the diagram. Find the values of n and A. [6]

5 (a) Variables x and y are related by the equation $y = \dfrac{e^{2x}}{2x + 3}$. Find the rate of change of y with respect to x when $x = 0$. [3]

(b) The equation of a curve is $x^2 + y^2 = xy + 7$. Show that the equation of the tangent to the curve at the point (3, 2) is $y + 4x = 14$. [5]

6



The diagram shows the curve $y = x^2 \cos x$ and a maximum point M.

(i) Show that the x-coordinate of M satisfies the equation $x \tan x = 2$. [4]

(ii) Use the iteration formula

$$u_{n+1} = \tan^{-1}\left(\frac{2}{u_n}\right),$$

with $u_1 = 1$, to find the x-coordinate of M correct to 2 decimal places, showing the values of u_2, u_3, ... as appropriate. [3]

(iii) Explain why the iteration formula, with the given value of u_1, gives the required value for the x-coordinate of M. [2]

7 (i) Show that $\int_0^{\frac{1}{4}\pi} \sin 2x \, dx = \frac{1}{2}$ and that $\int_0^{\frac{1}{4}\pi} \cos^2 x \, dx = \frac{1}{8}(\pi + 2)$. [6]

(ii) Use the results in part (i) to evaluate $\int_0^{\frac{1}{4}\pi} (2 \sin x + 3 \cos x)^2 \, dx$. [5]

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