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TUTGATHER PRACTICE PAPER

HONG KONG DIPLOMA OF SECONDARY EDUCATION EXAMINATION 2027

MATHEMATICS Extended Part Module M2
PAPER

Question-Answer Book

Candidate Number

TUTGATHER
PRACTICE PAPER · NOT AN OFFICIAL HKEAA PAPER

1 hour 5 minutes

This paper must be answered in English

Topic practice: Definite Integration

INSTRUCTIONS

(1) This paper consists of THREE sections, A(1), A(2) and B.

(2) Attempt ALL questions in this paper. Write your answers in the spaces provided in this Question-Answer Book. Do not write in the margins.

(3) Unless otherwise specified, all working must be clearly shown.

(4) Unless otherwise specified, numerical answers should be either exact or correct to 3 significant figures.

(5) The diagrams in this paper are not necessarily drawn to scale.

(6) Calculators and mathematical drawing instruments may be used.

(7) The marks for each question are shown in brackets.

(8) No extra time will be given after the 'Time is up' announcement.

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SECTION A(1) (16 marks)

1. Evaluate $\int_1^4 (3\sqrt{x} - \frac{2}{x^2})\,dx$. **(3 marks)**

2. It is given that $\int_0^5 f(x)\,dx = 12$ and $\int_0^3 f(x)\,dx = 5$. Find $\int_3^5 (2f(x) + 1)\,dx$. **(3 marks)**

3. Find the area of the region bounded by the curve $y = x^2 - 4x + 3$, the x-axis, and the lines $x = 0$ and $x = 2$. **(4 marks)**

Answers written in the margins will not be marked.
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4. Evaluate $\int_0^{\pi/4} x\sin 2x\, dx$. **(6 marks)**

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SECTION A(2) (24 marks)

5. Let f be an even function such that $\int_0^3 f(x)\,dx = 8$ and $\int_0^2 f(x)\,dx = 3$. **(7 marks)**

(a) Find $\int_{-2}^2 f(x)\,dx$.

(b) Find $\int_2^3 (f(x) + f(-x))\,dx$.

(c) Evaluate $\int_{-3}^3 xf(x)\,dx$.

6. The region R is bounded by the curve $y = \sqrt{x}$, the line $y = x - 2$, and the x-axis. **(8 marks)**

(a) Find the coordinates of the intersection point of $y = \sqrt{x}$ and $y = x - 2$.

(b) Find the area of R.

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7. Let $I = \int_0^1 \frac{x^2}{(x^2+1)^2}\,dx$. **(9 marks)**

(a) Using the substitution $x = \tan\theta$, show that $I = \int_0^{\pi/4} \sin^2\theta\cos\theta\,d\theta$.

(b) Hence evaluate I.

Answers written in the margins will not be marked.

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SECTION B (10 marks)

8. Let f be a continuous function on $[0, 1]$. **(10 marks)**

(a) Using the substitution $x = 1 - t$, show that $\int_0^1 f(1 - x)\,dx = \int_0^1 f(x)\,dx$.

(b) Hence evaluate $\int_0^1 \frac{x^3}{x^3 + (1 - x)^3}\,dx$.

END OF PAPER

Answers written in the margins will not be marked.

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