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UNIVERSITI SAINS MALAYSIA

Supplementary Semester Examination  
Academic Session 2003/04

April 2004

**IUK 191E – MATHEMATICS I**  
***[IUK 191E – MATEMATIK I]***

Duration: 3 hours

Masa: 3 jam

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Please check that the examination paper consists of **THREE (3)** printed pages before you commence this examination.

*[Sila pastikan bahawa kertas peperiksaan ini mengandungi **TIGA (3)** mukasurat yang bercetak sebelum anda memulakan peperiksaan ini.]*

Answer **FOUR** questions. Students are allowed to answer all questions in English OR Bahasa Malaysia OR combinations of both.

*[Jawab **EMPAT** soalan. Pelajar dibenarkan menjawab samada dalam Bahasa Inggeris ATAU Bahasa Malaysia ATAU kombinasi kedua-duanya.]*

1. (a) Write in exponential polar form taking  $\theta \in [0, 2\pi]$

$$z = 1 - i$$

(50 markah)

- (b) Find the area of the region enclosed by  $x = y^2$  and  $y = x - 2$

(50 markah)

2. (a) Find the natural domain of the functions

i)  $f(x) = \frac{1}{x-3}$

ii)  $g(x) = \sqrt{x^2 - 3}$

(50 markah)

- (b) Find  $\lim_{x \rightarrow 3} f(x)$  for

$$f(x) = \begin{cases} x^2 - 5, & x \leq 3 \\ \sqrt{x+13}, & x > 3 \end{cases}$$

(50 markah)

3. (a) Use Cramer's rule to solve

$$x_1 + 2x_2 + x_3 = 5$$

$$2x_1 + 2x_2 + x_3 = 6$$

$$x_1 + 2x_2 + 3x_3 = 9$$

(50 markah)

- (b) solve the equation

$$\frac{dy}{dx} - 4xy = x$$

(50 markah)

4. (a) Evaluate

(i)  $\int \frac{e^x}{\sqrt{1-e^{2x}}} dx$

(ii)  $\int \ln x dx$

(50 markah)

(b) Locate the relative extrema of  $f(x) = 3x^{\frac{2}{3}} - 15x^{\frac{1}{3}}$

(50 markah)

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