

CIE A Level 數學 9709 Paper 3

CIE A Level 數學 | 時限：110 分鐘 | 總分：75 分 | 共 11 題

甲部：對數、指數方程與部分分式

全部題目均須作答。不得使用計算機。

1. Without using a calculator, simplify: (a) $\log_2 48 - \log_2 3$, (b) $\log_5 10 + \log_5 2.5$, (c) $2\log_3 6 - \log_3 4$.
2. Solve $4^x - 9(2^x) + 8 = 0$.
3. Express $(7x + 8)/((x + 1)(x + 2))$ in partial fractions.
4. $f(x) = x^3 - 4x^2 + 5x - 6$. (a) Find the remainder when $f(x)$ is divided by $(x - 2)$. (b) Given that $(x - 3)$ is a factor, factorise $f(x)$ completely and explain why the quadratic factor has no real roots.

乙部：微分、積分、微分方程與數值方法

全部題目均須作答。須寫出運算步驟。

5. $f(x) = x^3 + 3x^2 - 9x + 5$. Find the coordinates of the stationary points and determine their nature.
6. Evaluate $\int_1^4 (2x + 3/\sqrt{x}) \, dx$, giving an exact value.
7. A curve satisfies $dy/dx = 2y/x$ and passes through $(1, 3)$. Find y in terms of x .
8. $f(x) = x^3 - 2x - 5$. (a) Show that $f(x) = 0$ has a root between $x = 2$ and $x = 3$. (b) Use the Newton-Raphson method with $x_0 = 2$ to find x_1 and x_2 , giving x_2 correct to 4 decimal places.

丙部：三角學、向量與複數

全部題目均須作答。角度以度為單位。

9. Solve $2\sin^2\theta + 3\cos\theta = 3$ for $0^\circ \leq \theta \leq 360^\circ$.
10. Vectors $\mathbf{a} = 2\mathbf{i} - \mathbf{j} + 3\mathbf{k}$ and $\mathbf{b} = -\mathbf{i} + 4\mathbf{j} - 2\mathbf{k}$. (a) Find $\mathbf{a} \cdot \mathbf{b}$. (b) Find the angle between $\mathbf{a}$ and $\mathbf{b}$.
11. $z = (4 - 2i)/(1 + i)$. Find z in the form $a + bi$, and state $|z|$ and $\arg z$ (in degrees).