

Edexcel IAL P3 Composite and Inverse Functions and Numerical Methods Practice Exam

Pearson Edexcel International A Level Mathematics · 12 questions · 59 marks

Name _____

Date _____

Score / 59

- Answer every question. Show your working: most marks are for method.
- Calculator allowed.
- Topics: Numerical methods; Composite and inverse functions.
- The mark scheme is a separate free PDF: alevelmathrevision.com/alevel-frontend/downloads/practice-exams/ial/edexcel-ial-p3-composite-and-inverse-functions-and-numerical-methods-practice-exam-mark-scheme.pdf

1. $f(x) = x^3 + 2x - 7$. Show that the equation $f(x) = 0$ has a root in the interval $[1.5, 1.6]$. [2] [2]
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2. $f(x) = \frac{x+1}{x-2}$, $x \neq 2$. A student notes that $f(1) = -2$ and $f(3) = 4$, and concludes that $f(x) = 0$ has a root between 1 and 3. Explain why the student is wrong. [2]
|
3. Using the iteration formula $x_{n+1} = (3x_n + 1)^{\frac{1}{5}}$ with $x_0 = 1.4$, find x_1 , x_2 and x_3 , giving your answers to 4 decimal places. [3]
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4. The functions f and g are defined by $f(x) = |x - 3|$, $x \in \mathbb{R}$, and $g(x) = x^2 - 2x$, $x \in \mathbb{R}$. Solve the equation $fg(x) = 5$. [4]
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5. The functions f and g are defined by $f(x) = 2x^2 - 3$, $x \geq 0$, and $g(x) = \frac{4}{x+1}$, $x \geq 0$. [5]
(a) Find $fg(1)$. [2]
(b) Find $f^{-1}(x)$ and state its domain. [3]
|



6. The functions f and g are defined by $f(x) = e^x + 2$, $x \in \mathbb{R}$, and $g(x) = \ln(x - 1)$, $x > 1$. [5]

(a) Find $fg(x)$ in its simplest form. [2]

(b) Find an expression for $gf(x)$. [1]

(c) Solve $gf(x) = 2$, giving your answer in exact form. [2]

7. $f(x) = \ln(x + 2) - \frac{x}{2}$, $x > -2$. [5]

(a) Show that $f(x) = 0$ has a root in the interval $[3.3, 3.4]$. [2]

(b) Show that $f(x) = 0$ can be written as $x = 2 \ln(x + 2)$. [1]

(c) Using $x_{n+1} = 2 \ln(x_n + 2)$ with $x_0 = 3$, find x_1 , x_2 and x_3 to 4 decimal places. [2]

8. The function f is defined by $f(x) = \frac{3x - 1}{x + 2}$, $x > -2$. [6]

(a) Show that $f(x) = 3 - \frac{7}{x + 2}$. [2]

(b) Hence state the range of f . [1]

(c) Find $f^{-1}(x)$, stating its domain. [3]

9. The functions f and g are defined by $f(x) = 5 - x^2$, $x \leq 0$, and $g(x) = 2x + 1$, $x \in \mathbb{R}$. [6]

(a) State the range of f and find $f^{-1}(x)$. [3]

(b) Solve the equation $fg(x) = -4$. [3]



10. The equation $e^x = 5x$ has two roots. The larger root is α . [7]

(a) Show that α lies in the interval $[2.5, 2.6]$. [2]

(b) Using $x_{n+1} = \frac{e^{x_n}}{5}$ with $x_0 = 2.5$, find x_1 , x_2 and x_3 to 4 decimal places. [2]

(c) Explain what your answers to (b) show. [1]

(d) Using $x_{n+1} = \ln(5x_n)$ with $x_0 = 2.5$, find x_1 , x_2 and x_3 to 4 decimal places. [2]

11. A sequence is defined by $x_{n+1} = \sqrt{4 + \frac{3}{x_n}}$, $x_1 = 2$. [7]

(a) Find x_2 , x_3 and x_4 to 4 decimal places. [3]

The sequence converges to α .

(b) Show that $\alpha^3 - 4\alpha - 3 = 0$. [2]

(c) Hence find the exact value of α . [2]

12. A curve has equation $y = x \ln x - \frac{x^2}{6}$, $x > 0$. [7]

(a) Show that the x -coordinates of the stationary points satisfy $x = 3 + 3 \ln x$. [3]

The larger stationary point has x -coordinate β .

(b) Show that β lies in the interval $[9.8, 9.9]$. [2]

(c) Using $x_{n+1} = 3 + 3 \ln x_n$ with $x_0 = 10$, find x_1 and x_2 to 4 decimal places. [2]



