

IB Maths AA SL Unit 5 Calculus Practice Exam

IB Mathematics: Analysis and Approaches SL · 9 questions · 53 marks

Name _____

Date _____

Score / 53

- Answer every question. Show your working: most marks are for method.
- Section A no calculator; Section B calculator allowed.
- Topics: Derivative concepts and applications; Power and Basic Derivatives; Basic Indefinite Integrals; Tangents, Normals and Extrema; Chain Rule; Definite Integrals and Area.
- The mark scheme is a separate free PDF: ibmathrevision.com/downloads/practice-exams/slaa/ib-maths-aa-sl-unit-5-calculus-practice-exam-mark-scheme.pdf

Section A: no calculator

1. Let $g(x) = x^3 - 12x + 5$. [4]

- Find $g'(x)$. [1]
- Find the values of x for which g is decreasing. [3]

2. The curve $y = ax^3 + bx^2$ passes through $(1, -1)$ and has gradient 0 at that point. [10]

- Write down two equations in a and b . [2]
- Find a and b . [3]
- Find the coordinates of the other point where the gradient is 0. [2]
- Find the equation of the tangent to the curve at $x = 2$. [3]



3. Find $\int \frac{x^3 - 2x}{x^3} dx$, for $x \neq 0$. [3]

4. The curve C has equation $y = x^2 - 4x + 7$. The point $P(3, 4)$ lies on C . [8]
- Find the equation of the tangent to C at P . [3]
 - Find the equation of the normal to C at P . [2]
 - The normal meets C again at Q . Find the coordinates of Q . [3]

5. Let $h(x) = x\sqrt{2x+1}$, for $x > -\frac{1}{2}$. [8]
- Show that $h'(x) = \frac{3x+1}{\sqrt{2x+1}}$. [3]
 - Find the x -coordinate of the stationary point of h . [2]
 - Find the equation of the tangent to the graph of h at $x = 4$. [3]

6. The gradient of a curve is given by $\frac{dy}{dx} = 4x^3 - \frac{2}{x^3}$, $x \neq 0$. The curve passes through $(1, 6)$. [6]
- Find the equation of the curve. [5]
 - Find the y -coordinate of the point on the curve where $x = 2$. [1]



7. Let $f(x) = \frac{1}{x}$, $x \neq 0$. The points $A\left(2, \frac{1}{2}\right)$ and $B\left(2+h, \frac{1}{2+h}\right)$, $h \neq 0$, lie on the graph of f . [7]
- Show that the gradient of the chord AB is $-\frac{1}{2(2+h)}$. [2]
 - Hence find $f'(2)$, explaining your reasoning. [2]
 - Find the equation of the tangent at A . [2]
 - State the rate of change of f at $x = 2$ and interpret its sign. [1]

Section B: calculator allowed

8. Let $f(x) = \sqrt{x}e^{-x/3}$, for $x \geq 0$. [3]
- Use technology to find $\int_0^4 f(x) dx$. [2]
 - Write down what this value represents for the graph of f . [1]
9. Let $f(x) = x^3 - 4x$, for $-1 \leq x \leq 3$. [4]
- Find $\int_{-1}^3 f(x) dx$. [1]
 - Find the total area enclosed between the graph of f and the x -axis for $-1 \leq x \leq 3$. [2]
 - Explain why the answers to (a) and (b) are different. [1]

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