Test 1

Maths IB$_2$ — 9 October 2024

subjets : *First Principle & rules of derivation*

Tot :[/ 45 marks]

Problem 1 [5 marks]

Let us consider the function $f: x \mapsto x^2 \quad 2x$

Show that:

Using the *First Principle*: $f'(x_0) = \lim_{h \to 0} \frac{f(x) \quad f(x_0)}{x \quad x_0}$

show that $f'(x_0) = 4x_0 \quad 2$ and find x_0 such that the *gradient* of the *tangent* at x_0 is 10

Problem 2 [40 marks]

For the following functions, find

i) the *derivative*,

ii) the *gradient* of the *tangent* and of the *normal* to the curve at $x = x_0$,

#	**function**	x_0	**derivative**	**gradient tangent at $x = x_0$**
1	$\frac{4}{5}x^5 \quad 14x$	2		
2	$36 \cdot \sqrt[3]{x}$	8		
3	$8x + \frac{32}{\sqrt{x}}$	4		
4	$7x \quad \frac{3\pi}{2}) \cos(x)$	$\frac{\pi}{2}$		
5	$e^x \cos(x)$	$\frac{\pi}{4}$		
6	$\frac{x^2 \quad 1}{x^2+1}$	1		
7	$e^{\sin(x)}$	0		
8	$x^2 \ln(x)$	1		
9	$\cos^2(x)$	$\frac{\pi}{4}$		
10	$\sin(x^3)$	$\sqrt[3]{\pi}$		

Bonus Find the derivative of $f(x) = e^{(e^{(e^x)})}$ [+3]