

## Pre Test 1

9 October 2024

Maths IB<sub>2</sub> AA

subjects : *First Principle & rules of derivation*

Tot : [      / 45 marks ]

### Problem 1

[5 marks]

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

Show that:

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

show that  $f'(x_0) = 4x_0 - 2$  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	$\frac{4}{5}x^5 - 14x$	2		
2	$36 \cdot \sqrt[3]{x}$	8		
3	$8x + \frac{32}{\sqrt{x}}$	4		
4	$(7x - \frac{3\pi}{2}) \cos(x)$	$\frac{\pi}{2}$		
5	$e^x \cos(x)$	$\frac{\pi}{4}$		
6	$\frac{x^2 - 1}{x^2 + 1}$	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  $f(x) = e^{(e^x)}$

[+3]