3. *[Maximum mark: 6]*

Let $f(x) = e^x \cos x$. Find the gradient of the normal to the curve of f at $x = \pi$.

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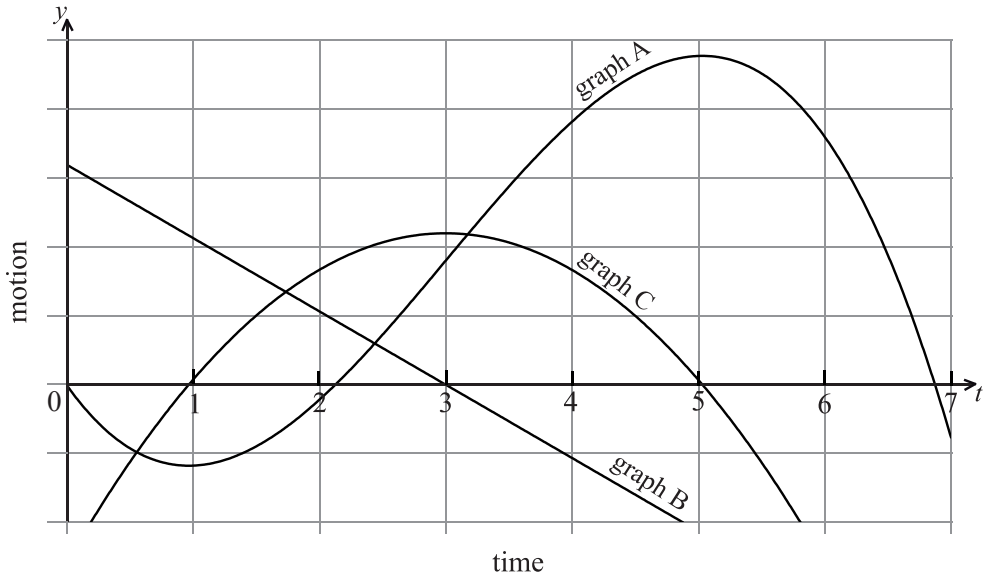
4. *[Maximum mark: 6]*

The following diagram shows the graphs of the **displacement**, **velocity** and **acceleration** of a moving object as functions of time, t.



(a) Complete the following table by noting which graph A, B or C corresponds to each function. *[4 marks]*

Function	Graph
displacement	
acceleration	

(b) Write down the value of t when the velocity is greatest. *[2 marks]*

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QUESTION 3

evidence of choosing the product rule ***(M1)***

$f'(x) = e^x \times (-\sin x) + \cos x \times e^x \quad (= e^x \cos x - e^x \sin x)$ ***A1A1***

substituting π ***(M1)***

e.g. $f'(\pi) = e^\pi \cos\pi - e^\pi \sin\pi$, $e^\pi(-1-0)$, $-e^\pi$

taking negative reciprocal ***(M1)***

e.g. $-\dfrac{1}{f'(\pi)}$

gradient is $\dfrac{1}{e^\pi}$ ***A1*** ***N3***

[6 marks]

QUESTION 4

(a)

Function	Graph
displacement	A
acceleration	B

A2A2 ***N4***

(b) $t = 3$ ***A2*** ***N2***

[6 marks]