

AP[®] CALCULUS AB
2017 SCORING GUIDELINES

Question 6

(a) $f'(x) = -2\sin(2x) + \cos x e^{\sin x}$

$$f'(\pi) = -2\sin(2\pi) + \cos \pi e^{\sin \pi} = -1$$

2 : $f'(\pi)$

(b) $k'(x) = h'(f(x)) \cdot f'(x)$

$$\begin{aligned} k'(\pi) &= h'(f(\pi)) \cdot f'(\pi) = h'(2) \cdot (-1) \\ &= \left(-\frac{1}{3}\right)(-1) = \frac{1}{3} \end{aligned}$$

2 : $\begin{cases} 1 : k'(x) \\ 1 : k'(\pi) \end{cases}$

(c) $m'(x) = -2g'(-2x) \cdot h(x) + g(-2x) \cdot h'(x)$

$$\begin{aligned} m'(2) &= -2g'(-4) \cdot h(2) + g(-4) \cdot h'(2) \\ &= -2(-1)\left(-\frac{2}{3}\right) + 5\left(-\frac{1}{3}\right) = -3 \end{aligned}$$

3 : $\begin{cases} 2 : m'(x) \\ 1 : m'(2) \end{cases}$

(d) g is differentiable. $\Rightarrow g$ is continuous on the interval $[-5, -3]$.

$$\frac{g(-3) - g(-5)}{-3 - (-5)} = \frac{2 - 10}{2} = -4$$

2 : $\begin{cases} 1 : \frac{g(-3) - g(-5)}{-3 - (-5)} \\ 1 : \text{justification,} \\ \quad \text{using Mean Value Theorem} \end{cases}$

Therefore, by the Mean Value Theorem, there is at least one value c , $-5 < c < -3$, such that $g'(c) = -4$.