

PROBLEM

If f and g are differentiable functions in $[0, 1]$ satisfying $f(0) = 2 = g(1)$, $g(0) = 0$ and $f(1) = 6$, then for some $c \in]0, 1[$

[JEE M 2014]

(a) $f'(c) = g'(c)$

(b) $f'(c) = 2g'(c)$

(c) $2f'(c) = g'(c)$

(d) $2f'(c) = 3g'(c)$

SOLUTION

(b) Since, f and g both are continuous functions on $[0, 1]$ and differentiable on $(0, 1)$ then $\exists c \in (0, 1)$ such that

$$f'(c) = \frac{f(1) - f(0)}{1 - 0} = \frac{6 - 2}{1} = 4$$

$$\text{and } g'(c) = \frac{g(1) - g(0)}{1 - 0} = \frac{2 - 0}{1} = 2$$

Thus, we get $f'(c) = 2g'(c)$