

Existence Theorems**Name:***AP Calculus*

The function f is continuous for $-2 \leq x \leq 1$ and differentiable for $-2 < x < 1$. If $f(-2) = -5$ and $f(1) = 4$, which of the following statements could be false?

- (A) There exists c , where $-2 < c < 1$, such that $f(c) = 0$.
- (B) There exists c , where $-2 < c < 1$, such that $f'(c) = 0$.
- (C) There exists c , where $-2 < c < 1$, such that $f(c) = 3$.
- (D) There exists c , where $-2 < c < 1$, such that $f'(c) = 3$.
- (E) There exists c , where $-2 \leq c \leq 1$, such that $f(c) \geq f(x)$ for all x on the closed interval $-2 \leq x \leq 1$.

Try this fun problem!

AP Calculus

Name:

No calculator is allowed for these problems.

t (minutes)	0	1	2	3	4	5	6
$C(t)$ (ounces)	0	5.3	8.8	11.2	12.8	13.8	14.5

3. Hot water is dripping through a coffeemaker, filling a large cup with coffee. The amount of coffee in the cup at time t , $0 \leq t \leq 6$, is given by a differentiable function C , where t is measured in minutes. Selected values of $C(t)$, measured in ounces, are given in the table above.
- (a) Use the data in the table to approximate $C'(3.5)$. Show the computations that lead to your answer, and indicate units of measure.
- (b) Is there a time t , $2 \leq t \leq 4$, at which $C'(t) = 2$? Justify your answer.