DATE: ____________

AP Multiple-Choice

The function f is continuous for $-2 \le x \le 1$ 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 a c, where $-2 < c < 1$, such that $f(c) = 0$.

B. There exists a c, where $-2 < c < 1$, such that $f'(c) = 0$.

C. There exists a c, where $-2 < c < 1$, such that $f(c) = 3$.

D. There exists a c, where $-2 < c < 1$, such that $f'(c) = 3$.

E. There exists a c, where $-2 \le c \le 1$, such that $f(c) \ge f(x)$ for all x on the closed interval $-2 \le x \le 1$.

f cont + diff'able (all VT's will work)

A. IVT → $\left.\begin{array}{l} f(-2) < 0 \\ f(1) > 0 \end{array}\right\} \therefore f(c) = 0$ for some c on $(-2, 1)$

$\boxed{\text{FALSE}}$ B. MVT → $f'(c) = \dfrac{f(-2) - f(1)}{-2 - 1} = \dfrac{-5-4}{-3} = \dfrac{-9}{-3} = 3$

↳ NOT ZERO, so MVT not guarantee that $f'(c) = 0$

C. IVT → $\left.\begin{array}{l} f(-2) < 3 \\ f(1) > 3 \end{array}\right\} \therefore f(c) = 3$ for some c on $(-2, 1)$

D. MVT → $f'(c) = \dfrac{f(1) - f(-2)}{1 - (-2)} = \dfrac{9}{3} = 3$ $\therefore f'(c) = 3$ for some c on $(-2, 1)$

E. EVT → $\underbrace{f(c)}_{\text{y-value @ x=c}} \underset{\text{greater than}}{\ge} \underbrace{f(x) \;\forall x \text{ on } [-2,1]}_{\text{all y-values for x on } [-2,1]}$

f cont, so there has to be at least one max and one min