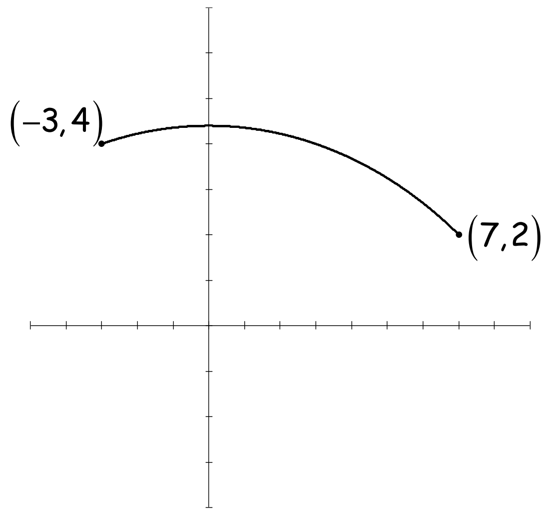
MVT AP Problems



D

1) (No Calculator) The graph of $y = f(x)$ on the closed interval $[-3,7]$ is shown in the figure above. If f is continuous on $[-3,7]$ and differentiable on $(-3,7)$, then there exists a c, $-3 < c < 7$, such that

A) $f(c) = 0$

B) $f'(c) = 0$

C) $f'(c) = \frac{1}{5}$

D) $f'(c) = -\frac{1}{5}$

E) $f'(c) = -5$

$$\frac{2-4}{7+3} = \frac{-2}{10} = \frac{-1}{5}$$

B

2) (No Calculator) Let f be the function given by $f(x) = x^3$. What are all values of c that satisfy the conclusion of the Mean Value Theorem on the closed interval $[-1,2]$?

A) 0 only

B) 1 only

C) $\sqrt{3}$ only

D) -1 and 1

E) $-\sqrt{3}$ and $\sqrt{3}$

$$\frac{f(2)-f(-1)}{3} = \frac{9}{3} = 3 \qquad f'(x) = 3x^2$$

$$3c^2 = 3 \qquad c^2 = 1 \qquad c = \pm 1$$

only $c = 1$

3) (No Calculator) Let $f(x)$ be a differentiable function defined only on the interval $-2 \le x \le 10$. The table below gives the value of $f(x)$ and its derivative $f'(x)$ at several points of the domain.

x	-2	0	2	4	6	8	10
$f(x)$	26	27	26	23	18	11	2
$f'(x)$	1	0	-1	-2	-3	-4	-5

C The line tangent to the graph of $f(x)$ and parallel to the segment between the endpoints intersects the y-axis at the point

A) (0, 27)

B) (0, 28)

C) (0, 31)

D) (0, 36)

E) (0, 43)

$$\frac{2-26}{10-(-2)} = \frac{-24}{12} = -2$$

p.o.t = (4, 23)

$y - 23 = -2(x-4)$ when $x = 0$

$y - 23 = 8$

$y = 31$

D 4) (Calculator OK) If $f(x) = \left|(x^2 - 12)(x^2 + 4)\right|$, how many numbers in the interval $-2 \le x \le 3$ satisfy the conclusion of the Mean Value Theorem?

A) None

B) One

C) Two

D) Three

E) Four

$$\frac{39 - 64}{5} = -5$$

how many times w/ $f'(x) = -5$

on the interval $(-2, 3)$