Name: KEY Date:________

AP Calculus AB

Chapter 4 Practice Quiz, L. 4.1 and 4.2

A GRAPHING CALCULATOR MAY NOT BE USED ON THIS QUIZ.

1. Find the (absolute) extreme values of the function whose graph is shown on $[a,b]$.

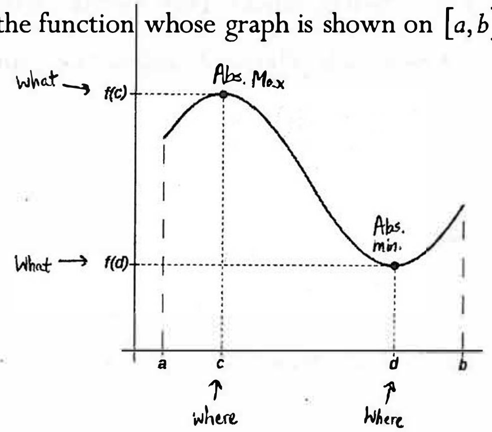
(A) Minimum d, maximum c

(B) Minimum c, maximum $f(c)$

(C) Minimum $f(d)$, maximum $f(c)$

(D) Minimum $f(c)$, maximum $f(d)$

(E) Minimum a and d, maximum c and b



2. Find the values of x where the extreme values of the function $y = x^4 - 2x^2 - 8$ occur.

* Look for endpoints, $f'(x)=0$, or $f'(x)$ D.N.E

$y' = 4x^3 - 4x$

$y' = 4x(x^2-1)$

$y' = 4x(x+1)(x-1)$

$y' = 0 \Rightarrow x = 0, \pm 1$

* The extreme values of y occur at $x=0, \pm 1$.

Candidate Test:

x	y
-2	0
-1	-9
0	-8
1	-9
2	0

3. Find the absolute maximum of the function $f(x) = 4x^3 - 17x^2 + 24x$.

• Need $f'(x)=0$ or $f'(x)$ D.N.E.

$f'(x) = 12x^2 - 34x + 24$

$f'(x) = 0 \Rightarrow 12x^2 - 34x + 24 = 0$

$2(6x^2 - 17x + 12) = 0$

$2(6x^2 - 9x - 8x + 12) = 0$

$2[3x(2x-3) - 4(2x-3)] = 0$

$2(3x-4)(2x-3) = 0$

$x = 4/3, 3/2$

Candidate Test:

x	y
0	0
4/3	11.259 ← local max.
3/2	11.25 ← local min.
2	12

∴ There is no abs. max.

4. Find the interval or intervals on which the function whose graph is shown is decreasing.

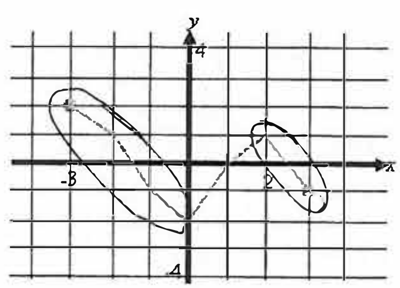
(A) $(-\infty, -3]$

(B) $[-3, 0]$

(C) $[0, 2]$

(D) $[2, 3]$

(E) $[-3, \cancel{2}] \cup [2,3]$
0



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AP Calculus AB

Chapter 4 Quiz, L. 4.1 and 4.2

A GRAPHING CALCULATOR IS REQUIRED FOR SOME QUESTIONS ON THIS PART OF THE QUIZ.

5. Find the function whose derivative is $f'(x) = 6x$ and whose graph passes through the point $(1, -9)$.

$f'(x) = 6x$

$f(x) = \frac{6x^2}{2} + C$

$f(x) = 3x^2 + C$

$f(1) = 3(1)^2 + C = -9$

$3 + C = -9$

$C = -12$

$\therefore f(x) = 3x^2 - 12$

6. What are the two hypotheses of the Mean Value Theorem for derivatives?

I. f must be continuous on $[a,b]$.

II. f must be differentiable on (a,b).

What is the conclusion of the MVT for Derivatives if these two hypotheses are true?

There exists a point $(c, f(c))$ in $[a,b]$ such that $f'(c) = \frac{f(b)-f(a)}{b-a}$

7. For $y = \frac{-\ln x}{x^2 - 2e^x}$, use graphing techniques to find the approximate intervals on which the function is

$y' = \frac{(x^2-2e^x)\left(\frac{-1}{x}\right) + (-\ln x)(2x-2e^x)}{(x^2-2e^x)^2}$

$y' = 0 \Rightarrow \frac{(x^2-2e^x)}{-x} = -\ln x(2e - 2e^x)$

$x^2 - 2e^x = +\ln x(2ex - 2xe^x)$

Maximum using calculator $(1.791, 0.066)$

(a) increasing.

$(0, 1.791)$

(b) decreasing.

$(1.791, \infty)$

(c) Then find any extreme values.

$(1.791, 0.066)$

8. The derivative of a function is $g'(x) = 8x^3 + 6x - 7$ and the graph of g passes through the point $(2, 32)$. Find $g(x)$.

$g'(x) = 8x^3 + 6x - 7$

$g(x) = \frac{8x^4}{4} + \frac{6x^2}{2} - 7x + C$

$g(x) = 2x^4 + 3x^2 - 7x + C$

$g(2) = 2(2)^4 + 3(2)^2 - 7(2) + C = 32$

$32 + 12 - 14 + C = 32$

$-2 + C = 0$

$C = 2$

$\therefore g(x) = 2x^4 + 3x^2 - 7x + 2$