Good afternoon: assessment is being delayed to tomorrow -___-

Additional practice for skills:

D-AD7: Interpreting Derivative Graph
p. 184 #70

D-AD5: Implicit Differentiation
p.145 #21-38

D-AD8: Absolute and Relative Extrema
abs: p167 #17-26
rel: p183 #17-30 part b

D-AD18: Linear Approximation
p. 237 #37-40

D-AD9: Intervals of Increase/Decrease
p183 #17-30 part a

What topics would you like additional preparation for?

We'll do a mini lesson on 2 of them in about 15 minutes

- Interpreting Derivative Graph
- Absolute and Relative Extrema algebraically
- Intervals of Increase/Decrease
- Linear Approximation
- Implicit Differentiation
- Interpeting the Derivative

https://pollev.com/nmhcde875

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Relative Extrema

Find/Justif any relative/local extrema.

$$y = -x^3 + x^2 + 5x - 1$$

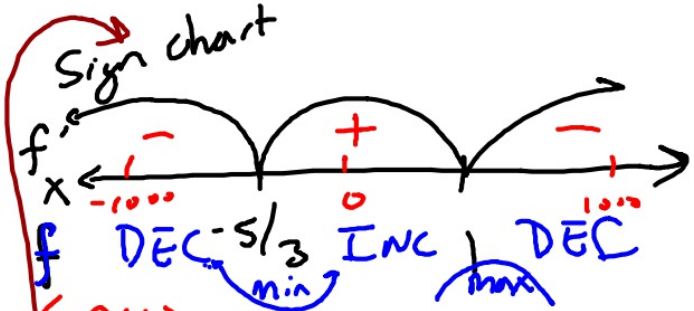
Find C.N.

$$y' = -3x^2 + 2x + 5 = 0$$

$$-1(3x^2 - 2x - 5) = 0$$

$$-1(3x+5)(x-1) = 0$$

$$\underbrace{x = -5/3 \qquad x = 1}_{\text{C.N.}}$$



$f'(0) = 5 \rightarrow +$

$f'(1000) = -1(3000+5)(3000-1)$

$= -$

$f'(-1000) = -1(-3000+5)(-3000-1)$

$-1 \cdot (-) \cdot (-) = -$

Answer:

- f has a rel. max @ $x = 1$ b/c f' changes from $+ \rightarrow -$.
  (or, f changes inc $\rightarrow$ dec.)
- f has a rel. min @ $x = -5/3$ b/c f' changes from $- \rightarrow +$.
  (or, f changes dec $\rightarrow$ inc.)

Absolute Extrema

$y = -x^4 + 3x^2 - 3 \quad [0,2]$

Find C.N.

$\frac{dy}{dx} = -4x^3 + 6x = 0$

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

$x = 0 \qquad 2x^2 = 3$

$x = \pm\sqrt{\frac{3}{2}}$

$x = \sqrt{\frac{3}{2}}, \cancel{-\sqrt{3/2}}$ not in $[0,2]$

Plug C.N. & Endpts into f

- $f(0) = -3$
- $f(2) = -(2)^4 + 3(2)^2 - 3$

$-16 + 3\cdot 4 - 3$

$-16 + 12 - 3$

$f(2) = \underline{-7}$ ABS MIN $(2,-7)$

- $f(\sqrt{3/2})$

$= -(\sqrt{3/2})^4 + 3(\sqrt{3/2})^2 - 3$

$-\frac{9}{4} + 3\cdot\frac{3}{2} - 3$

$-\frac{9}{4} + \frac{18}{4} - 3 \rightarrow \frac{9}{4} - \frac{12}{4}$

$\underline{-3/4}$

Abs max

$(\sqrt{3/2}, -3/4)$

$$\left.\frac{dy}{dx}\right|_{(2,1)} \quad \text{for} \quad 2x^2 \overbrace{-2x\,y}^{f\quad g} = \underbrace{x^2}_{f}\underbrace{y^2}_{g}$$

prod rule

$\frac{d}{dx}$ $\frac{d}{dx}$

$$4x - 2y - 2xy' = 2xy^2 + x^2\cdot 2yy'$$

$$-2x^2yy' - 2xy' = 2xy^2 - 4x + 2y$$

$$y'(-2x^2y - 2x) = 2xy^2 - 4x + 2y$$

$$y' = \frac{2xy^2 - 4x + 2y}{-2x^2y - 2x}$$

simplify

$$\frac{dy}{dx} = \frac{xy^2 - 2x + y}{-x^2y - x}$$

plug in $(2,1)$

$$\frac{2\cdot 1^2 - 2(2) + 1}{-(2)^2(1) - 2} = \frac{-1}{-6} = 1/6$$

$=$