

lus 1

Name _____

Block _____ Date _____

Show for Graphing & Application of Derivatives (A) Find the requested information for the given function, then sketch a graph.

$$= x^3 - 6x^2 + 9x - 4$$

$$= 3x^2 - 12x + 9$$

$$x=1, 3$$

$$(-\infty, 1) (3, \infty)$$

$$(1, 3)$$

$$\text{Same Value(s): } (1, 0) (3, -4)$$

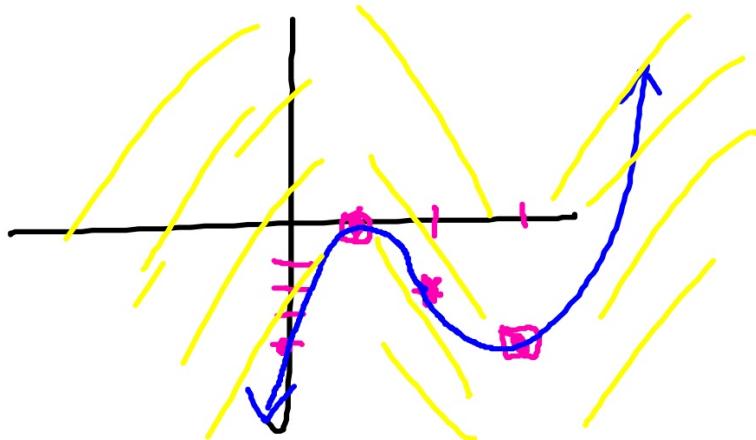
$$f''(x) = 6x - 12$$

$$\text{C. V. } x=2$$

$$\text{C. U. } (2, \infty)$$

$$\text{C. D. } (-\infty, 2)$$

$$\text{Point(s) of Inflection: } (2, -2)$$



Determine if the mean value theorem applies to the given interval? If not, state why. If it does work, calculate the value of x at which it occurs. $f(x) = \frac{6}{x} - 3$ on the interval $[1, 2]$

Yes

$$f(1) = 3$$

$$f(2) = 0$$

$$m = \frac{0 - 3}{2 - 1} = \frac{-3}{1} = -3$$

$$f(x) = 6x^{-1} - 3$$

$$f'(x) = -6x^{-2} = -\frac{6}{x^2}$$

$$-\frac{6}{x^2} = -3$$

$$x \neq 0$$

$$-6 = -3x^2$$

$$2 = x^2$$

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

$$x = \sqrt{2}$$

Find the absolute minimum and absolute maximum values of $f(x)$ on the given interval.

$$v) f(x) = x^3 - 12x + 1, [-3, 5]$$

$$f'(x) = 3x^2 - 12 = 0$$

$$f(-3) = 10$$

$$f(5) = 46 \quad \text{Abs. Max}$$

$$f(2) = -15 \quad \text{Abs. Min}$$

$$f(-2) = 17$$

$$3x^2 = 12$$

$$x^2 = 4$$

$$x = \pm 2$$

Sketch a graph of the function from the given information.

$$f(-7) = 6, \quad f(-3) = 3, \quad f(8) = 3, \quad f(10) = 4$$

$$f'(-7) = f'(-3) = f'(2) = f'(8) = 0$$

$$f''(x) > 0 \text{ for } (-\infty, -7] \cup [-3, 0) \cup [8, \infty)$$

$$f''(x) < 0 \text{ for } [-7, -3] \cup (0, 5) \cup (5, 8]$$

$$f''(-5) = f''(2) = f''(10) = 0$$

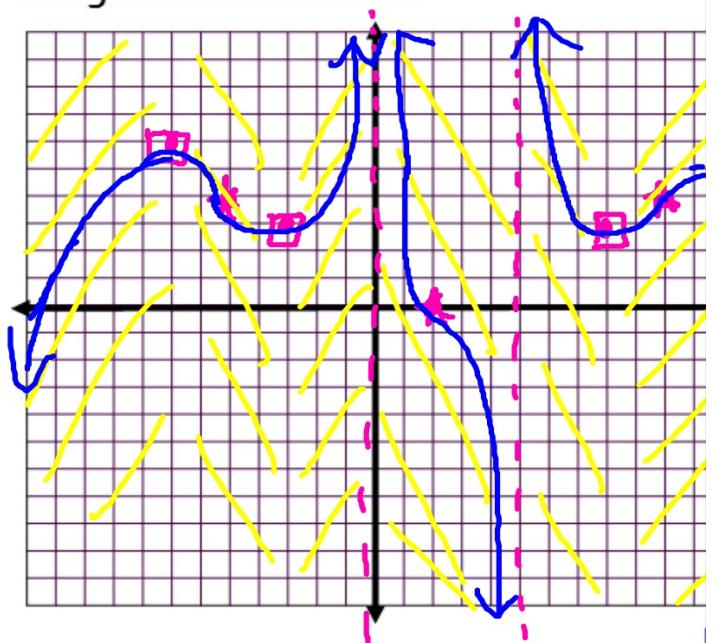
$$f'''(x) > 0 \text{ for } (-5, 0) \cup (0, 2) \cup (5, 10)$$

$$f'''(x) < 0 \text{ for } (-\infty, -5) \cup (2, 5) \cup (10, \infty)$$

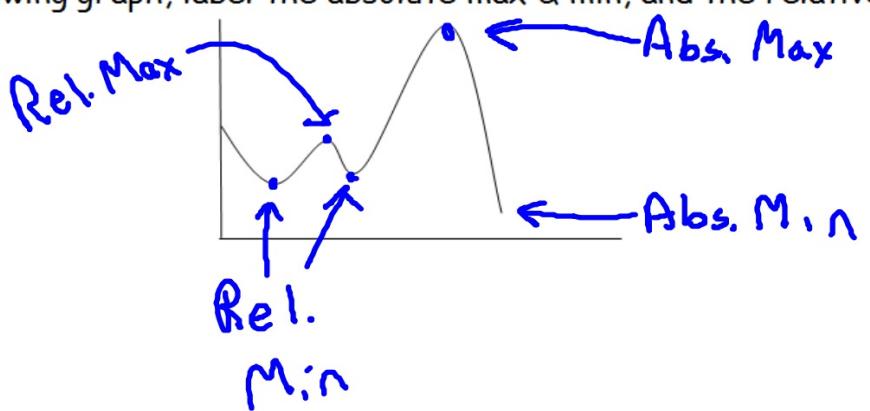
$$\lim_{x \rightarrow -\infty} f(x) = \infty, \quad \lim_{x \rightarrow 0^+} f(x) = \infty,$$

$$\lim_{x \rightarrow 5^-} f(x) = -\infty, \quad \lim_{x \rightarrow 5^+} f(x) = \infty$$

$$\lim_{x \rightarrow \infty} f(x) = 5$$



7) Given the following graph, label the absolute max & min, and the relative max & min.



en the function $f(x) = 2x^4 - 4x^2 + 1$ Answer the following questions, showing all work.

Domain: $(-\infty, \infty)$ Range: $(-1, \infty)$

x-intercepts:

$$(0, 1) \quad x = \pm 0.541, \pm 1.31$$

derivative:

$$f'(x) = 8x^3 - 8x$$

asing: $(-1, 0) \cup (1, \infty)$

asing: $(-\infty, -1) \cup (0, 1)$

What is the equation of the tangent line at $x=-2$?

nd derivative: $f''(x) = 24x^2 - 8$

ve up: $(-\infty, -0.577) \cup (0.577, \infty)$

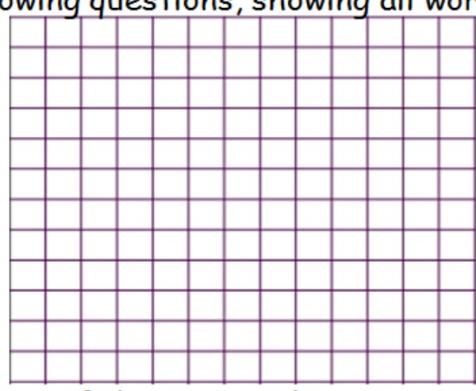
ve down: $(-0.577, 0.577)$

What is/are the equation(s) of the tangent line
at the extreme value(s)?

me Value(s): Abs. Min: $(1, -1)$ / Rel. Max: $(0, 1)$

s) of inflection:

$$(0.577, -0.11) \quad (-0.577, -0.11)$$



$$f'(-2) = -48 \quad 17 = -48(-2) + b \quad b = -79 \quad y = -48x - 79$$

$$y = -48x - 79$$

$$y = 1$$

$$y = -1$$

