

Calc Mini Lesson

AP problems on Applying Derivs

812. Consider the curve $y = x^3 + x$.

- Find the tangents to the curve at the points where the slope is 4.
(line(s))
- What is the smallest slope of the curve?
- At what values x does the curve have the slope found in part (b)?

$$a.) \quad \frac{dy}{dx} = \sqrt{3x^2 + 1} = 4$$

$$3x^2 = 3$$

$$x^2 = 1 \quad \rightarrow \quad x^2 - 1 = 0$$

$$\underline{x = \pm 1}$$

$$\frac{x=1}{y=2}$$

$$\frac{x=-1}{y=-2}$$

$$y - \boxed{2} = 4(x - 1)$$

$$y + \boxed{2} = 4(x + 1)$$

812. Consider the curve $y = x^3 + x$.

- Find the tangents to the curve at the points where the slope is 4.
- What is the smallest slope of the curve?
- At what values x does the curve have the slope found in part (b)?

b.) Minimize slope

$$\frac{dy}{dx} = 3x^2 + 1$$

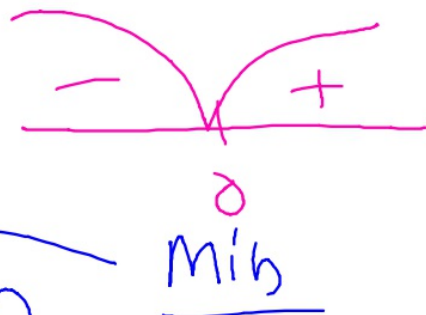
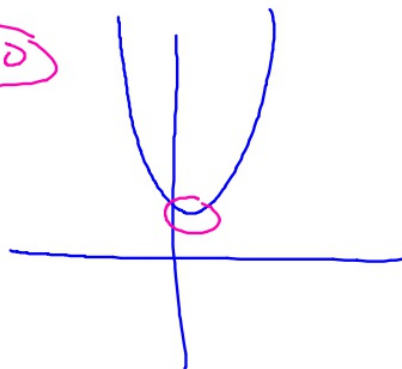
$$\frac{d^2y}{dx^2} = 6x = 0$$

$$x = 0$$

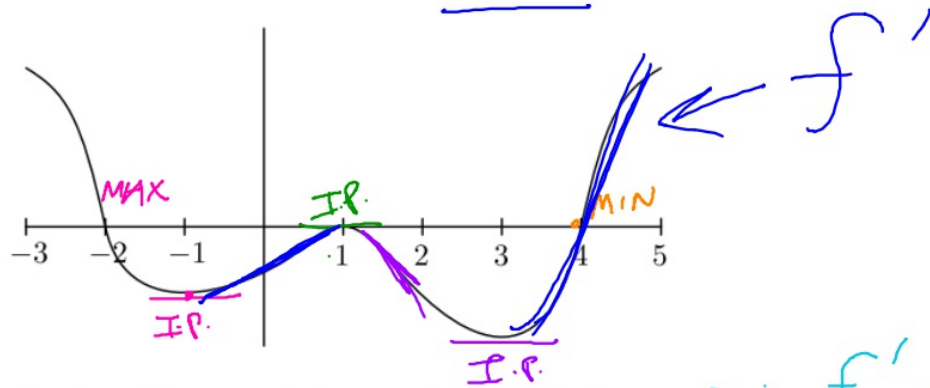
location of min

$$\frac{dy}{dx} \Big|_{x=0} \rightarrow 3(0)^2 + 1 \rightarrow 1$$

$$x = 0$$



813 (1996AB). The figure below shows the graph of f' , the derivative of a function f . The domain of f is the set of all real numbers x such that $-3 < x < 5$.



a) For what values of x does f have a relative maximum? Why?

b) For what values of x does f have a relative minimum? Why?

c) On what intervals is the graph of f concave upward? Use f' to justify your answer.

d) Suppose that $f(1) = 0$. Draw a sketch of f that shows the general shape of the graph on the open interval $0 < x < 2$.

-2 ; f' changes $+ \rightarrow -$

4 ; f' changes $- \rightarrow +$

$f'' + \rightarrow f'$ inc.

$(-1, 1)$ $(3, 5)$ [f' inc.]

