I, ~~key~~ , know I need to know the information below.

AP Calculus AB: Chapter 4 Review

1. Use the function $f(x) = \begin{cases} \frac{\cancel{(x+1)}(x+2)^2}{\cancel{(x+1)}}, & x \leq -1 \\ e^{x+1}, & x > -1 \end{cases}$ to answer the questions below.

a) Is the function $f(x)$ differentiable? Justify.

cont

$\lim_{x \to -1} f(x) = 1$

$f(-1) = 1$

$\lim_{x \to -1} f(x) = f(-1)$

diff

$2(x+2)'(1)$ $\quad (1) e^{x+1}$

$2 \quad\quad 1$

$\boxed{\lim_{x \to -1^-} f'(x) \neq \lim_{x \to -1^+} f'(x) \quad \text{not diff at } x = -1}$

b) Can you apply the Mean Value Theorem for the interval [-5,-2]? If you can then find the c-value guaranteed by the MVT for the interval [-5,-2].

yes because f(x) is diff on the interval [-5,-2]

$f'(x) = \frac{f(-2) - f(-5)}{-2 - -5}$

$2(x+2)'(1) = \frac{0 - 9}{3}$

$2x + 4 = -3$

$2x = -7$

$\boxed{x = \frac{-7}{2}}$

3. The table below represents a differentiable function. Using the table answer the questions below.

x	-1	0	3	4	7
f(x)	-5	-2	10	12	8

a) Does the function represented in the table above have any horizontal tangent lines? 1 because the function whent from increasing to decreasing from [4,7] so since the function is diff the MVT guarentees a value.

b) What is the average rate of change from [0,3].

$\frac{f(3) - f(0)}{3 - 0} = \frac{10 - -2}{3} = \frac{12}{3} = 4$

c) Does the function represented ever have the circumstance $f'(x) = 4$. Justify.

Yes because f(x) is diff so the MVT guarentees a point where the AROC = IROC and the AROC from [0,3] is 4.

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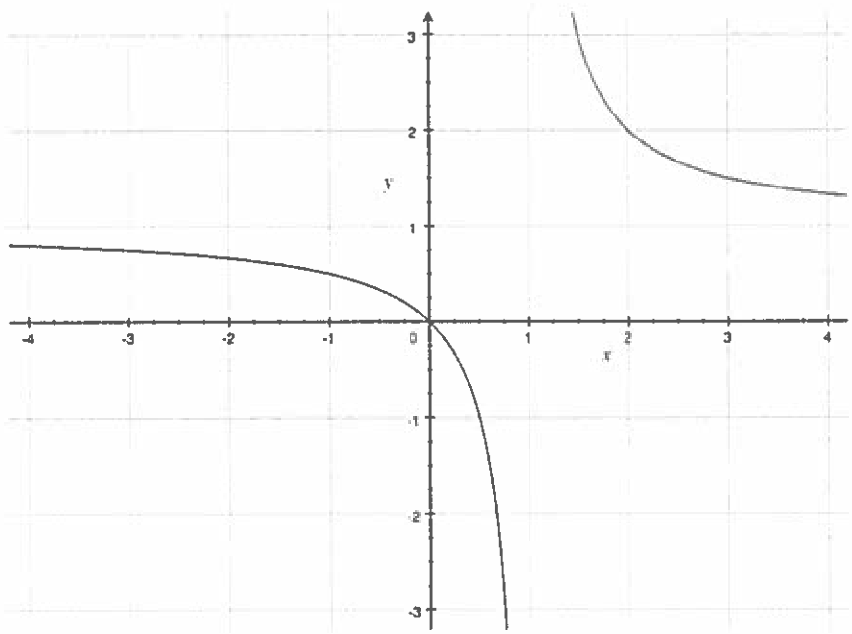
4.



The graph above is a representation of the derivative of $f(x)$. Answer the questions below using the graph above.

a) Where is the function $f(x)$ decreasing?

$[0,1]$ because $f'(x)$ is negative

b) Are there any critical values (max/mins) on $f(x)$. If so, are they max(s) or min(s)? Justify.

$x=0$ is a max because $f'(x)$ switched from + to −

c) Where is the function $f(x)$ increasing and concave down? Justify.

$(-\infty,0)$ $(1,\infty)$ because $f'(x)$ is + and decreasing

d) If the function $f(x)$ has a point $f(2) = 9$. Find the instantaneous rate of change of $y = \sqrt{f(x)}$ at x=2.

$y' = \frac{1}{2}f(x)^{-1/2} \cdot f'(x) = \frac{f'(x)}{2\sqrt{f(x)}} =$

$y'(2) = \frac{\cancel{(2)}}{\cancel{2}\sqrt{9}} = \boxed{\frac{1}{3}}$