

MATH 108 - QUIZ 8 - 23 MARCH 2011

Answer all of the following questions in the space provided. Show all work as partial credit may be given. Answers without justification, even if they are correct, will earn no credit.

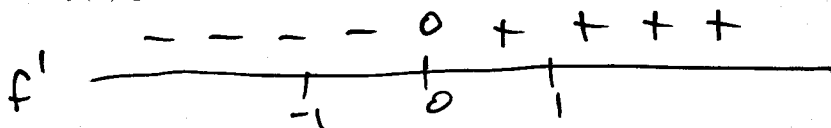
1. (4 pts. each) Let $f(x) = \frac{x^2}{x^2 + 1}$

(a) Find all horizontal and vertical asymptotes (if any) of $f(x)$ given above.

$x^2 + 1 = 0$ has no solution so no vertical asymptote

$\lim_{x \rightarrow \infty} \frac{x^2}{x^2 + 1} = 1$ so horizontal asymptote at $y = 1$

(b) Given that $f'(x) = \frac{2x}{(x^2 + 1)^2}$, find the intervals of increase and decrease for the function $f(x)$ given above.



$$\frac{2x}{(x^2 + 1)^2} = 0$$

$$x = 0$$

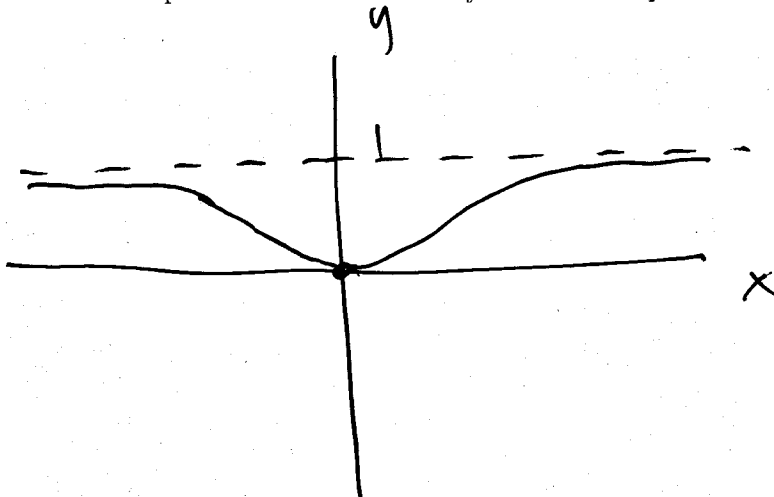
$$f'(-1) = \frac{-2}{(2)^2} < 0 \quad f'(1) = \frac{2}{2^2} > 0$$

f increasing on ~~$(-1, \infty)$~~ $(0, \infty)$
 decreasing on $(-\infty, 0)$

only critical number

Critical point $(0, 0) \leftarrow$ local min

(c) Using the information from parts (a) and (b), sketch the graph of $f(x)$. (The sketch does not have to be perfect but should convey the basic shape of the curve accurately.)



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Answer all of the following questions in the space provided. Show all work as partial credit may be given. Answers without justification, even if they are correct, will earn no credit.

1. (4 pts. each) Let $f(x) = \frac{x^2}{x-2}$

(a) Find all horizontal and vertical asymptotes (if any) of $f(x)$ given above.

$x-2=0 \quad x=2 \leftarrow$ vertical asymptote //

$\lim_{x \rightarrow \infty} \frac{x^2}{x-2} = \lim_{x \rightarrow \infty} \frac{x^2}{x} = \lim_{x \rightarrow \infty} x = \infty$
no horizontal asymptote

(b) Given that $f'(x) = \frac{x(x-4)}{(x-2)^2}$, find the intervals of increase and decrease for the function $f(x)$ given above.

$\frac{x(x-4)}{(x-2)^2} = 0 \quad x=0 \quad x=4$
 f' undefined at $x=2$

f increasing on $(-\infty, 0) \cup (4, \infty)$
 f decreasing on $(0, 2) \cup (2, 4)$

$f'(-1) = \frac{(-1)(-5)}{(+)} > 0$ $f'(1) = \frac{(1)(-3)}{(+)} < 0$ $f'(3) = \frac{(3)(-1)}{(+)} < 0$
 $f'(5) = \frac{(5)(1)}{(+)} > 0$

(c) Using the information from parts (a) and (b), sketch the graph of $f(x)$. (The sketch does not have to be perfect but should convey the basic shape of the curve accurately.)

