MA121 - 002

Tuesday, October 2

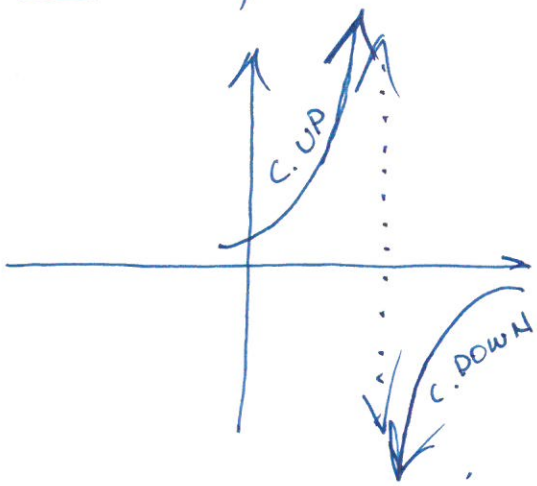
TEST #2
TH. 10/11
(not 2.5)

2.3:

COMPREHENSIVE GRAPHING:

(1) $f'(x)$ INFO

(2) $f''(x)$ INFO



change in CONCAV (no point of INFLECTION)

(3) VERTICAL ASYMP:

$y = \frac{f(x)}{g(x)}$ $\quad y = \frac{5}{x-4}$

$x \neq 4$

V.A.: $x = 4$

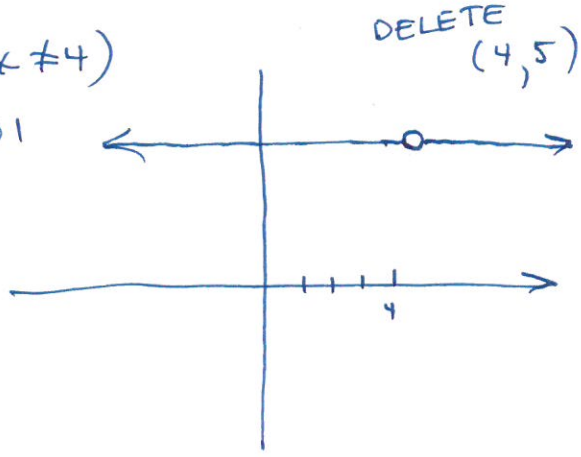
(4) "HOLE" IN THE GRAPH: $(x \neq 4)$

$y = \frac{5(x-4)}{(x-4)}$

LIKE FACTOR

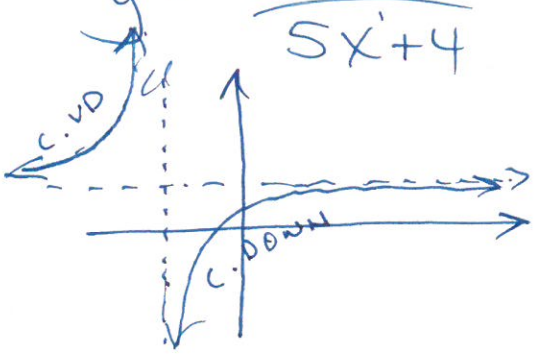
$x = 4.001$

$y = 5$



(5) HORIZONTAL ASYMPTOTE:

$y = \frac{2x-1}{5x+4}$



V.A.: $x = -4/5$

H.A.: $\lim_{x \to \infty} \frac{2x-1}{5x+4} = \frac{2}{5}$

$y = 2/5$

$y' = +$ ALWAYS POS

(6) OBLIQUE (slant) ASYMPTOTE:

$$y = \frac{x^{2} + 2x - 5}{x - 1}$$

V.A.: $x = 1$

H.A.:

$$\lim_{x \to \infty} \frac{x^2 + 2x - 5}{x - 1} \quad \text{D.N.E.}$$

NO HORIZ ASYMP.

* degree of NUM is one larger than degree of DENOM

$$x - 1 \overline{)\, x^2 + 2x - 5}$$

$x + 3 + \frac{-2}{x-1}$

$-(x^2 - x)$

$3x - 5$

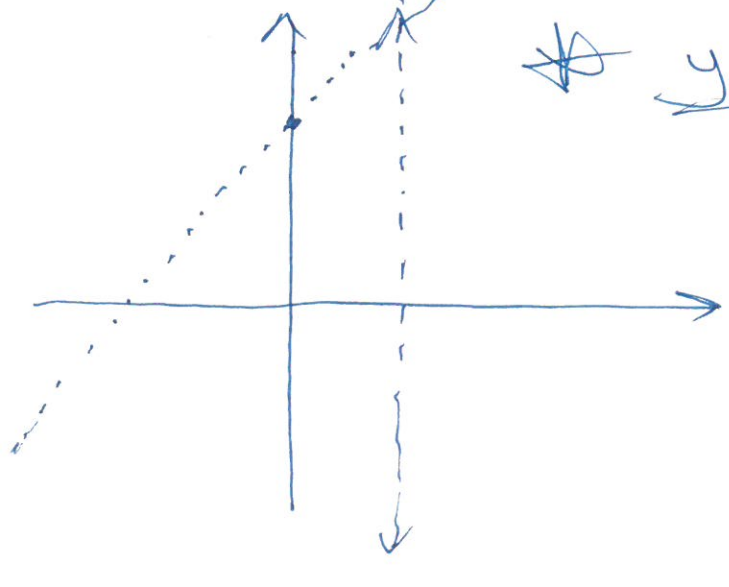
$-(3x - 3)$

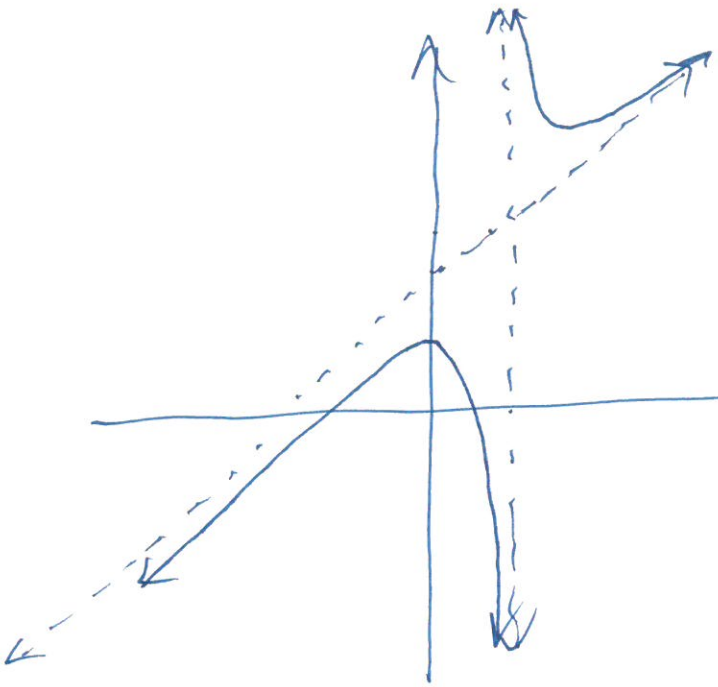
-2

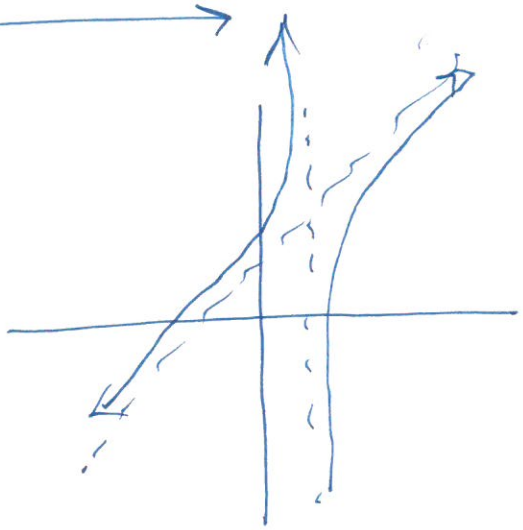
$$\frac{x^2 + 2x - 5}{x - 1} = x + 3 + \frac{-2}{x-1}$$

$\frac{-2}{x-1} \to 0$ as $x \to \infty$

* $y = x + 3$ is a SLANT ASYMP.



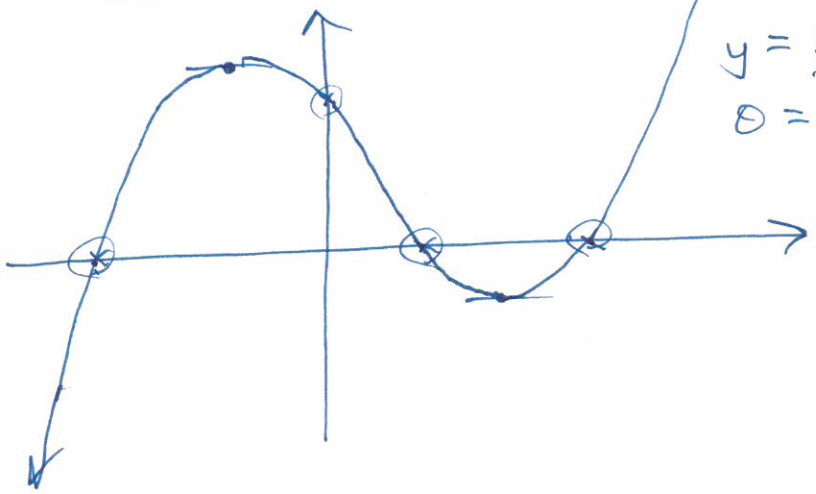




(7) INTERCEPTS:

set $x=0$: $(0, ?)$

set $y=0$: $(?, 0)$ $y=-1$ $(0,-1)$



$y = 2x^3 - 5x^2 + 8x - 1$

$0 = 2x^3 - 5x^2 + 8x - 1$

(4)

$$y = \frac{6x}{8x+3}$$

V.A.: $x = -3/8$ ✓

H.A.: $y = 3/4$ $\quad \lim_{x\to\infty} \frac{6x}{8x+3} = \frac{6}{8} = \frac{3}{4}$

$$y' = \frac{(8x+3)\cdot 6 - (6x)\cdot 8}{(8x+3)^2}$$

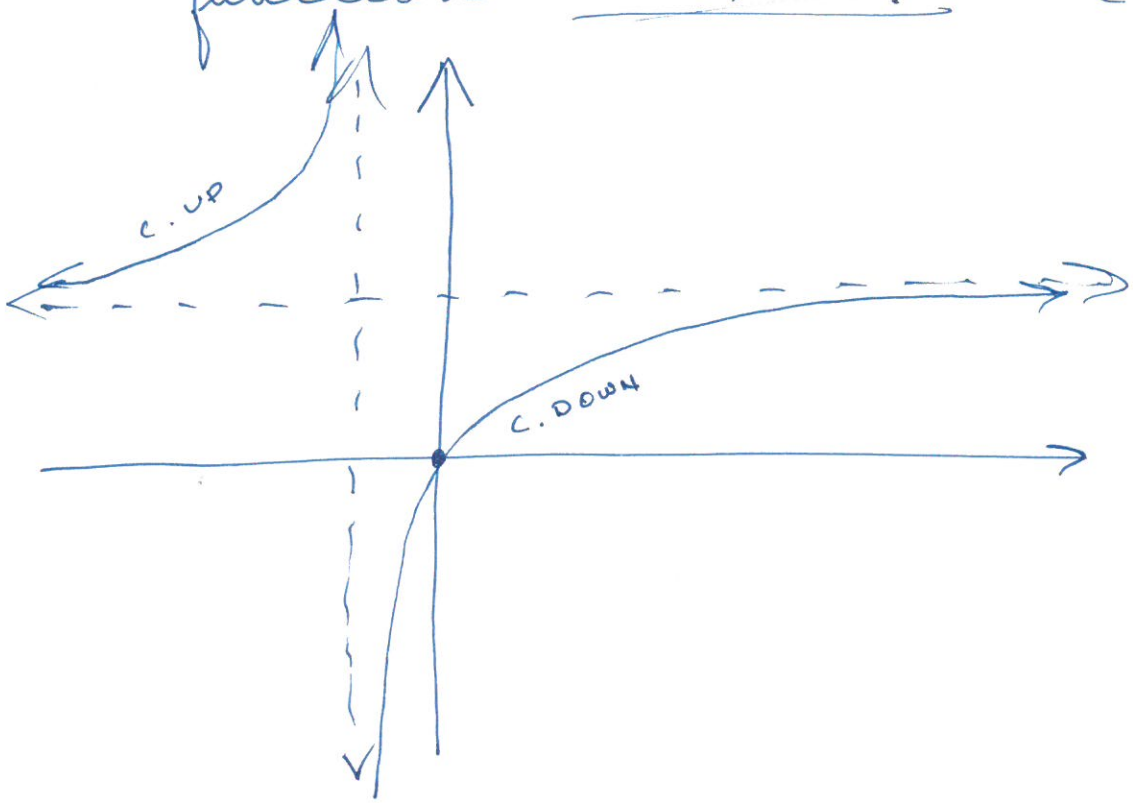
$$y' = \frac{48x + 18 - 48x}{(8x+3)^2} = \frac{18}{(8x+3)^2} = +$$

$y' \neq 0$

$(0, 0)$

$(\infty, 0)$

function INCREASES.



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

$x \neq 1$ "hole" $(1, ?)$

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

$(0,1)$

~~$(?, 0)$~~

V.A.: $x = -1$

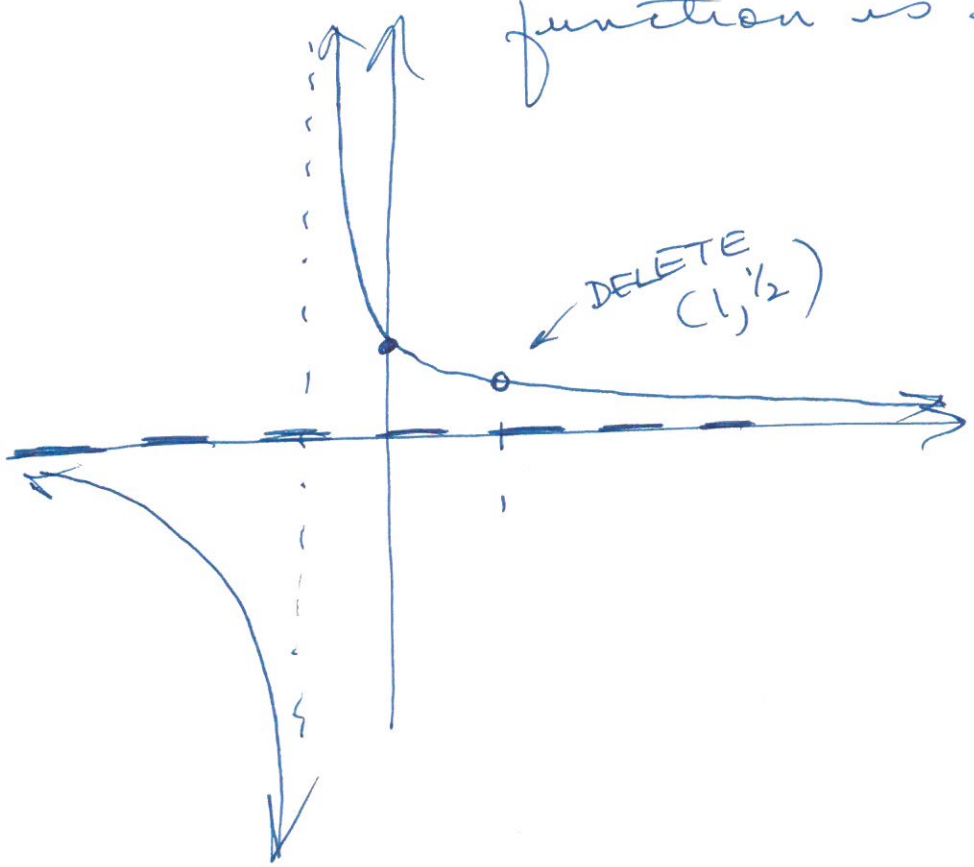
H.A.: $\lim_{x \to \infty} \left(\frac{1}{x+1}\right) = 0$ $\quad y = 0$

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

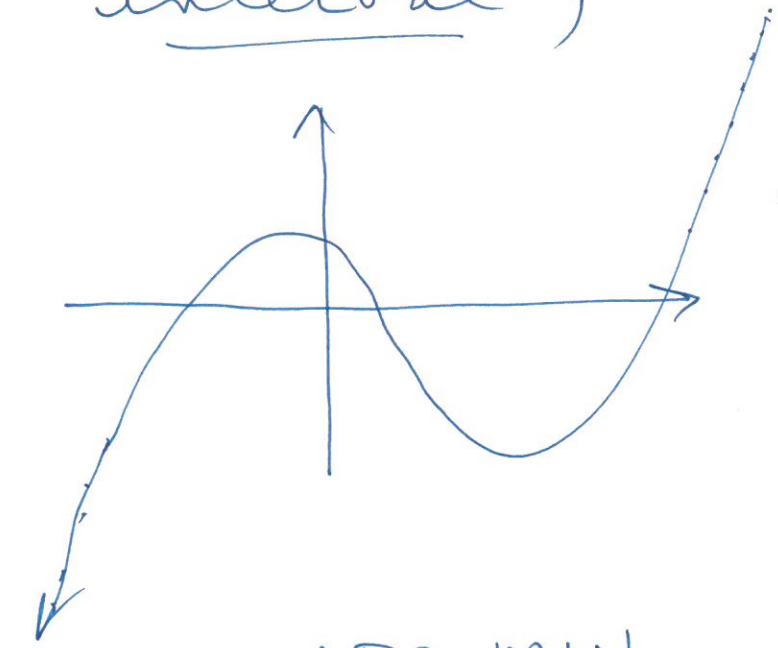
$(1, \frac{1}{2})$

$$y' = \frac{-1}{(x+1)^2} = \text{NEG}$$

function is DECR.

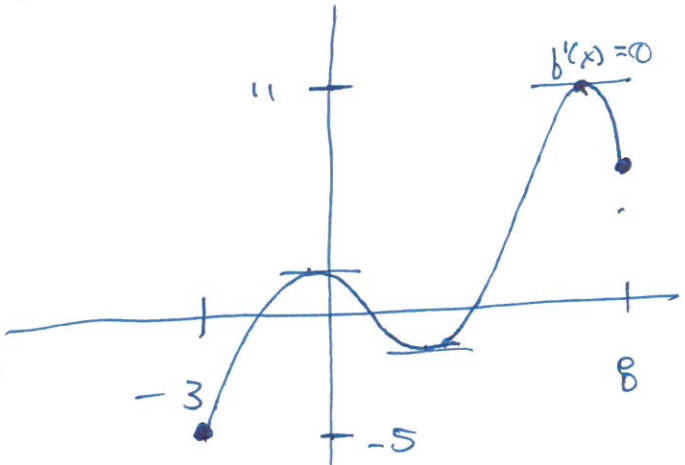


2.4: ABSOLUTE MAX/MIN OF A FUNCTION (on a CLOSED interval)



NO ABS MAX

NO ABS MIN



① CRITICAL PT

② ENDPOINT

find the ABS. MAX VALUE OF THE FUNCTION on [a, b]. (HIGHEST Y-VALUE)

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find the ABS MIN

-5

$f(x) = x^3 - 3x$ on $[-5, 2]$

$x = -5$ $\quad$ $x = 2$

(1) endpoints:

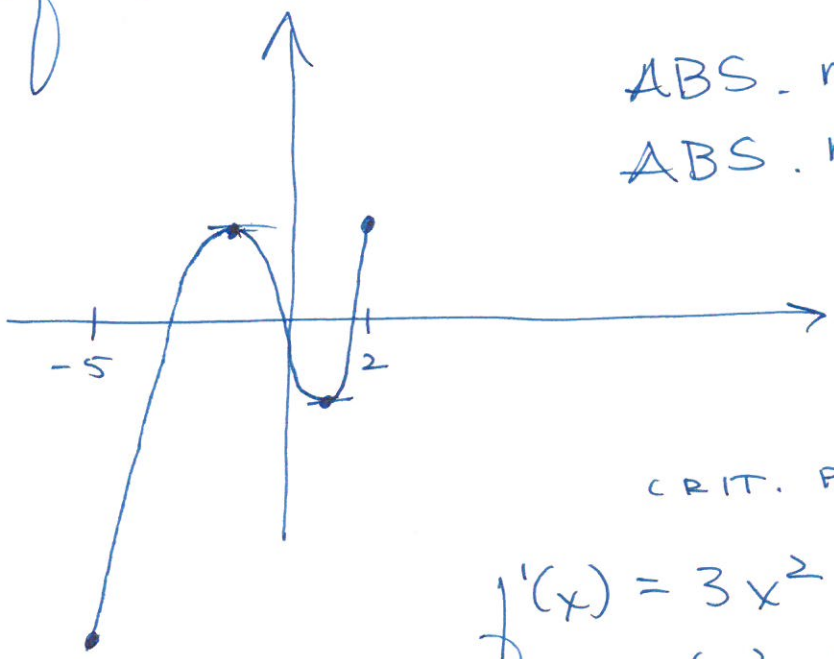
$(-5, -110) = (-5, ??)$

$f(-5) = (-5)^3 - 3(-5)$

$f(-5) = -125 + 15 = -110$

$(2, ??) = (2, 2)$

$f(2) = (2)^3 - 3(2) = 2$



ABS. MAX: 2

ABS. MIN: -110

$f'(x)$:

CRIT. PTS:

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

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

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

$x - 1 = 0$ $\quad$ $x + 1 = 0$

$x = 1$ $\quad$ $x = -1$

$(1, -2)$ $\quad$ $(-1, 2)$

$f(1) = 1^3 - 3(1)$ $\quad$ $f(-1) = (-1)^3 - 3(-1)$

$f(1) = -2$