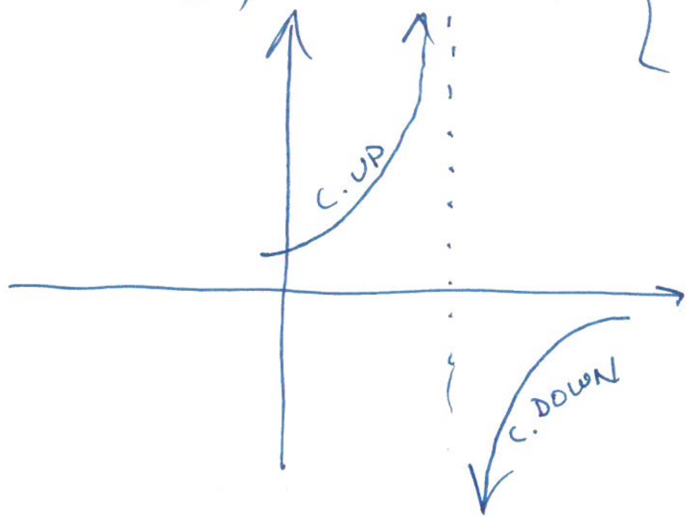
MA121-001 (1)

Tuesday, October 2

TEST #2
TH OCT 11
(not 2.5)




no point of infl.

## 2.3: COMPREHENSIVE GRAPHING

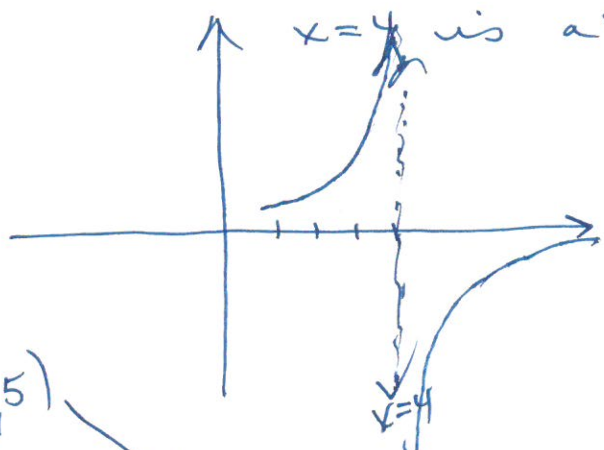
1.) $f'(x)$ INFO

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

3.) vertical asymptotes:

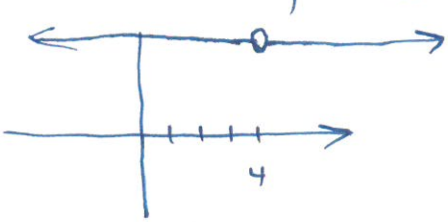
$$f(x) = \frac{5}{x-4}$$ (not a LIKE FACTOR)

$x=4$ is a V.A.




(4,5)

4.) "hole" in the graph:




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

($x=4$ is not a V.Asymp.)

$f(x) = 5$ , $x \neq 4$

5.) horizontal asymp.

$$y = \frac{f(x)}{g(x)}$$

$$\lim_{x \to \infty} \frac{f(x)}{g(x)} = K \qquad (y = K \text{ is H.A.})$$

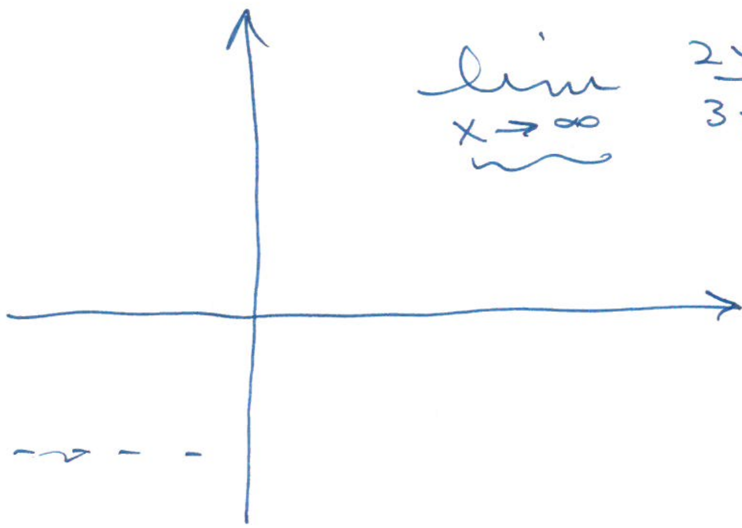
$$y = \frac{2x-1}{3x+5}$$

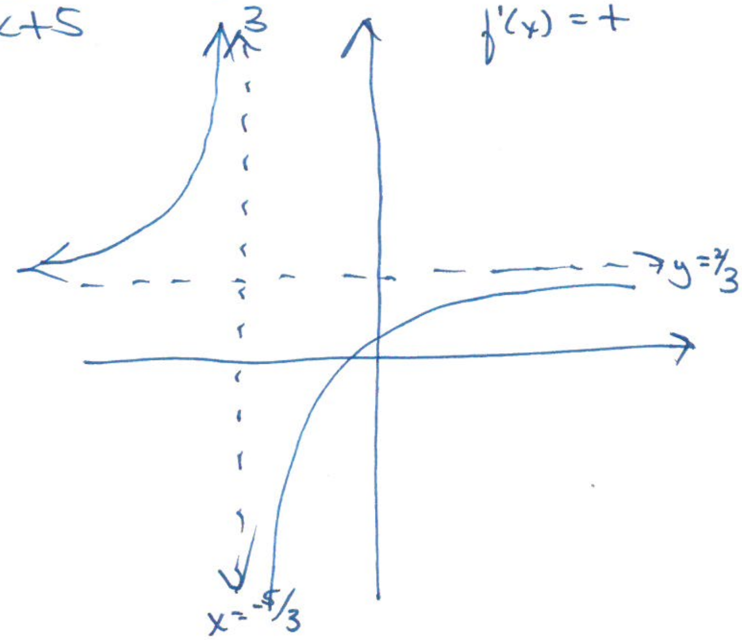
V.A: $x = -5/3$

H.A.: $y = 2/3$

$$\lim_{x \to \infty} \frac{2x-1}{3x+5} = \frac{2}{3}$$

$f'(x) = +$






6.) OBLIQUE (slant) ASYMPTOTE:

$$f(x) = \frac{x^2+2x-5}{x^1+1}$$

degree of NUM is ONE greater than degree of DENOM

$$x + 1 + \frac{-6}{x+1}$$

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

$$-(x^2+x)$$

$$x-5$$

$$-(x+1)$$

$$-6$$

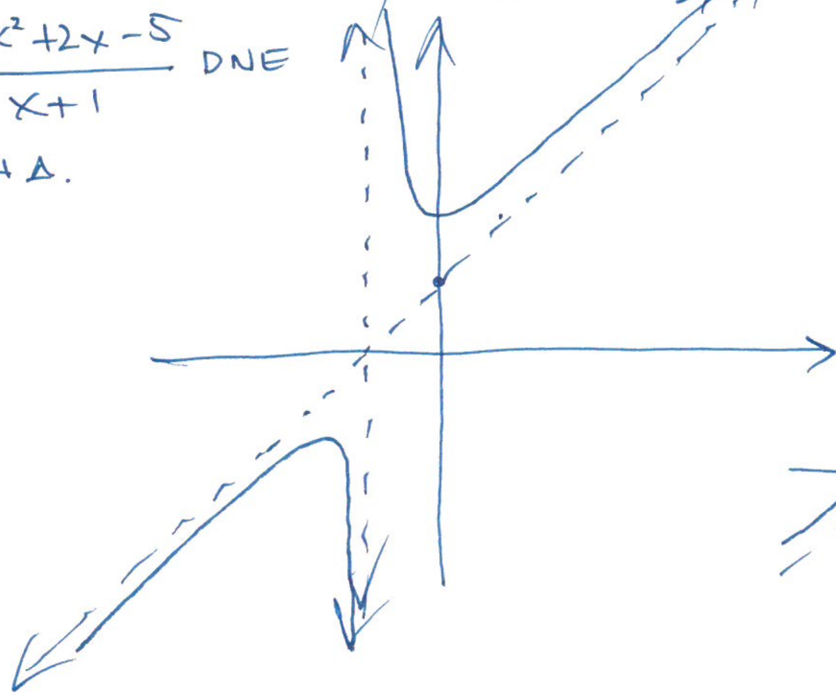
$$f(x) = \frac{x^2+2x-5}{x+1} = x+1 + \frac{-6}{x+1}$$

$\frac{-6}{x+1} \to 0$ as $x \to \infty$

$f(x) = x+1$
(slant asymptote)

$\lim_{x\to\infty} \frac{x^2+2x-5}{x+1}$ DNE

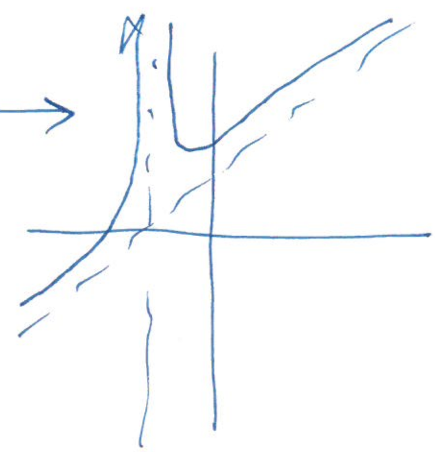
no H A.



V.A.: $x=-1$

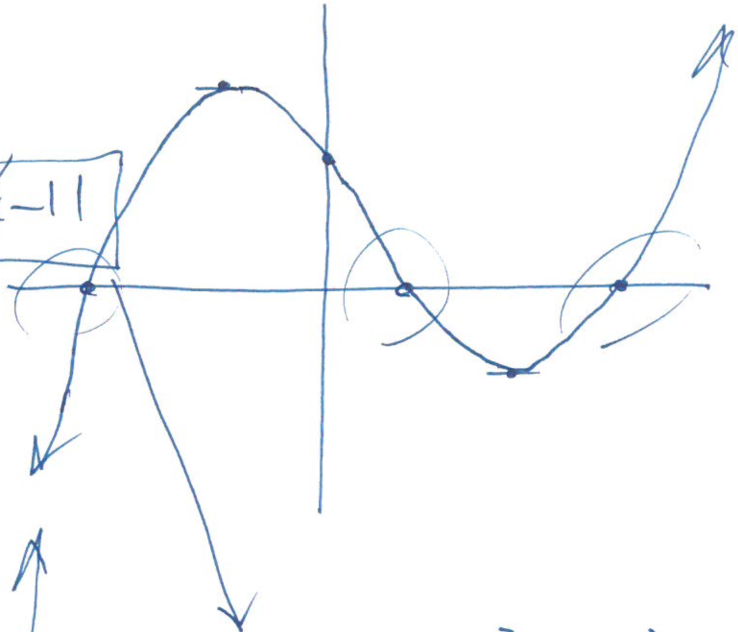
H A.: none

S.A: $y = x+1$



7.) find x & y intercepts

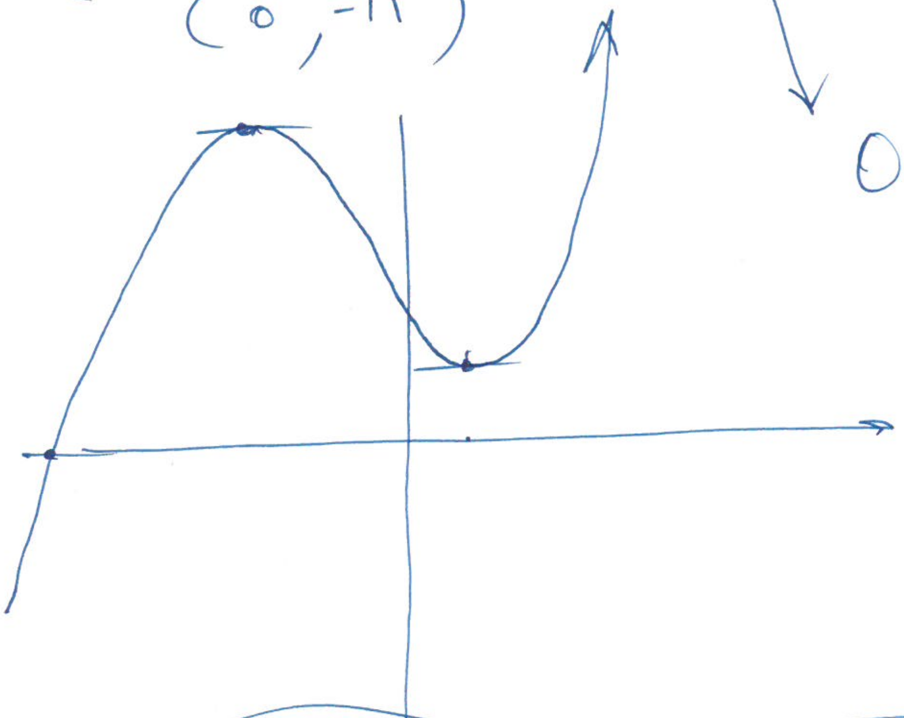
$\boxed{f(x) = 3x^3 - 5x^2 + 14x - 11}$



$f(0) = -11$

(y-int)

$(0, -11)$



$0 = 3x^3 - 5x^2 + 14x - 11$

not easy factoring

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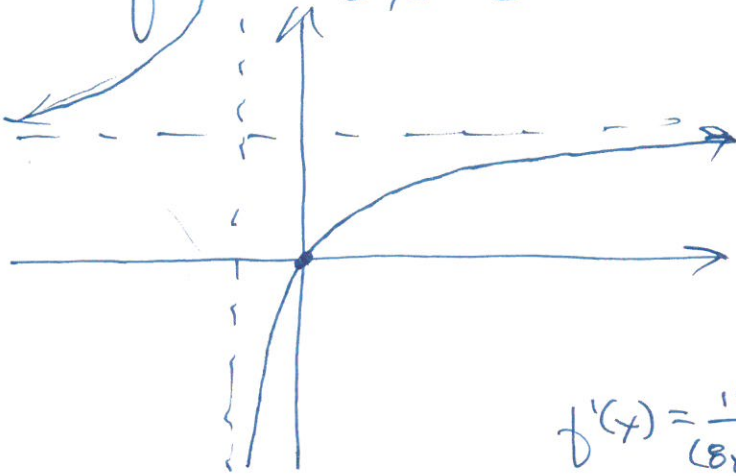
$f(x) = \dfrac{6x}{8x+3}$



$f(0) = 0 \qquad (0, 0)$

$\dfrac{6x}{8x+3} = 0$

V.A.: $x = -3/8$

H.A.: $\lim_{x \to \infty} \dfrac{6x}{8x+3} = \dfrac{6}{8} = \dfrac{3}{4}$

$y = 3/4$

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

$f'(x) = \dfrac{\cancel{48x} + 18 - \cancel{48x}}{(8x+3)^2}$

$f'(x) = \dfrac{18}{(8x+3)^2}$ $f'(x) = +$

f(x) INCR

$$f(x) = \frac{x-1}{x^2-1} = \frac{\cancel{x-1}^{\,1}}{\cancel{(x-1)}_{\,1}(x+1)}$$

hole in graph at $x = 1$

$(1, ?)$

$\uparrow$

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

$$\boxed{f(x) = \frac{1}{x+1}}$$ ✓

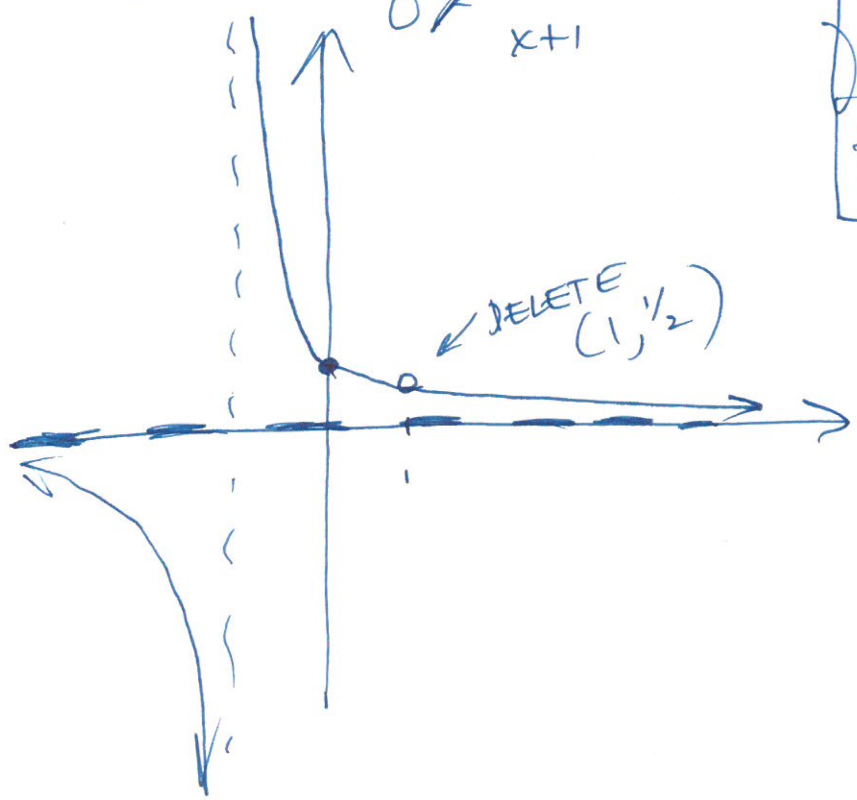
$(0, 1)$

V.A.: $x = -1$

H.A.: $y = 0$ (no S.A.)

~~$(?, 0)$~~

$0 \overset{?}{\neq} \frac{1}{x+1}$




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

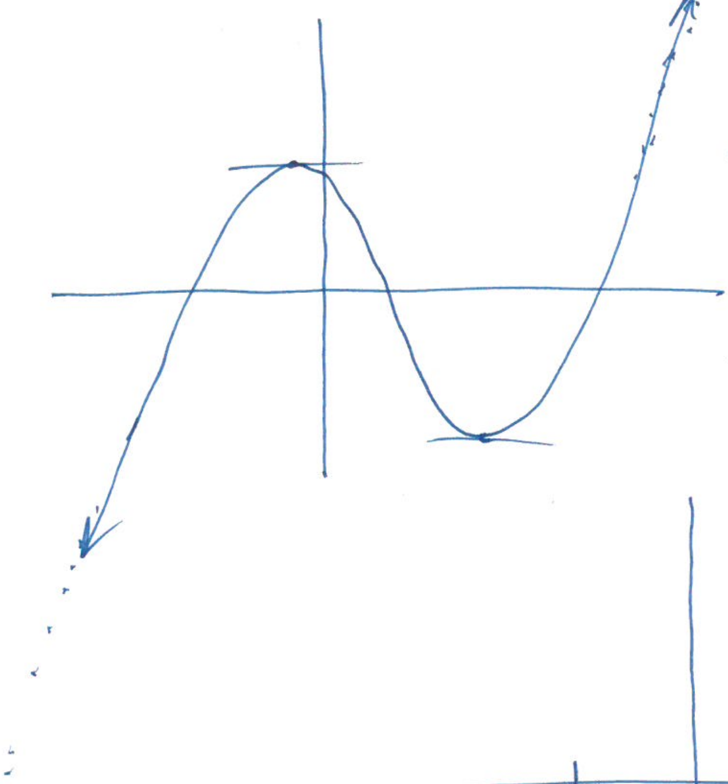
$$\boxed{f'(x) = \frac{-1}{(x+1)^2}} = -$$

$f(x)$ DECR ✓

# 2.4: USING F'(x) & F''(x) TO FIND ABSOLUTE MAX/MIN

(on a closed interval)

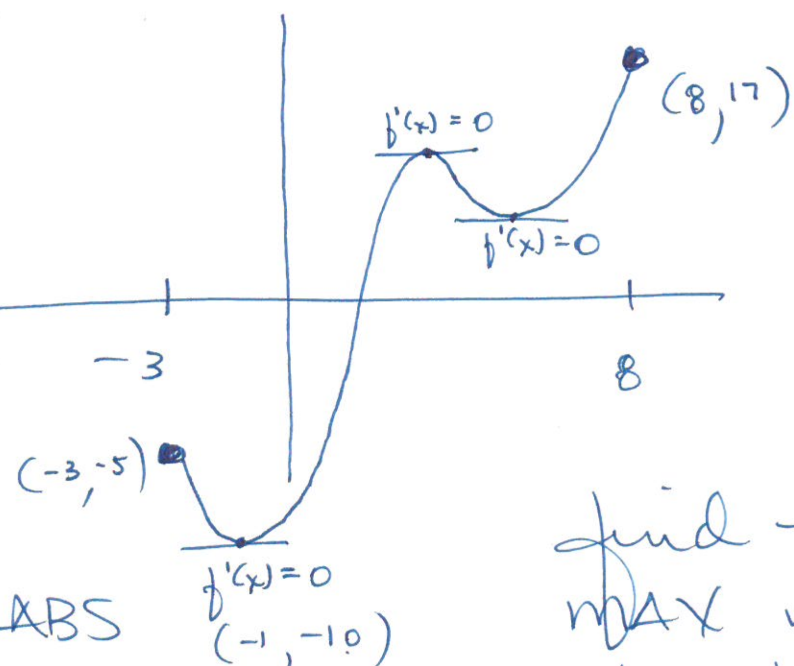
check the ENDPOINTS!!



no ABSOL MAX

no ABSOL MIN

[-3, 8]




(-3, ?)

(8, ?)

find the ABS MIN value of the function:

-10 → critical point

find the ABS MAX value of the function:

17 → endpoint

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

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

① $3x^2 - 3 = 0$

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

$\boxed{3(x-1)(x+1)} = 0$

$x = 1$ ; $x = -1$

$(1, -2)$ & $(-1, 2)$

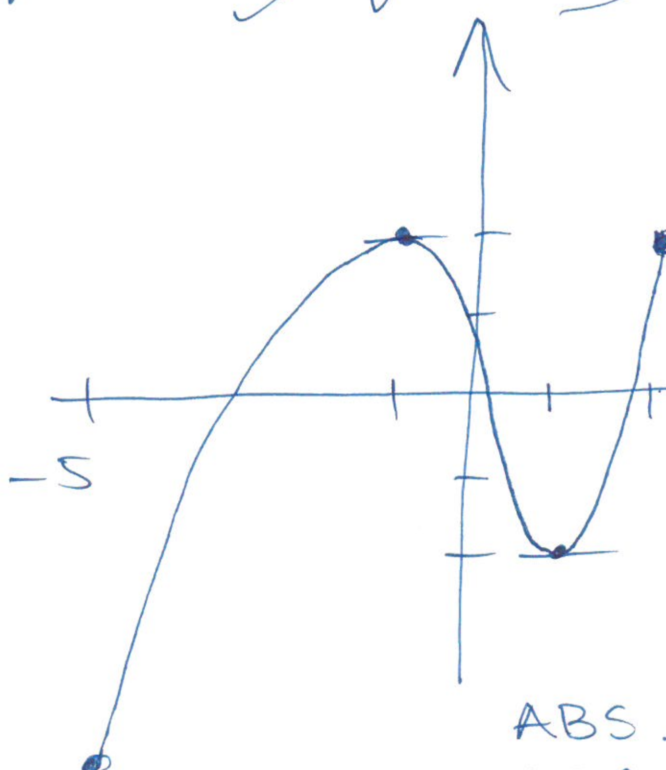
$f(1) = -2$ $\quad$ $f(-1) = 2$

$f'(x) = 3(x-1)(x+1)$

$f'(x)$:

$f'(-2) = + \cdot - \cdot - = +$ $\quad$ $f'(0) = + \cdot - \cdot + = -$ $\quad$ $f'(2) = + \cdot + \cdot + = +$

$f(x)$ INCR $\quad -1 \quad$ $f(x)$ DECR $\quad 1 \quad$ $f(x)$ INCR




endpts:

$(-5, ?)$

$(2, ?)$

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

$= -125 + 15$

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

$f(2) = 2$

ABS. MIN: $-110$

ABS. MAX: $2$