Abraham Sherman

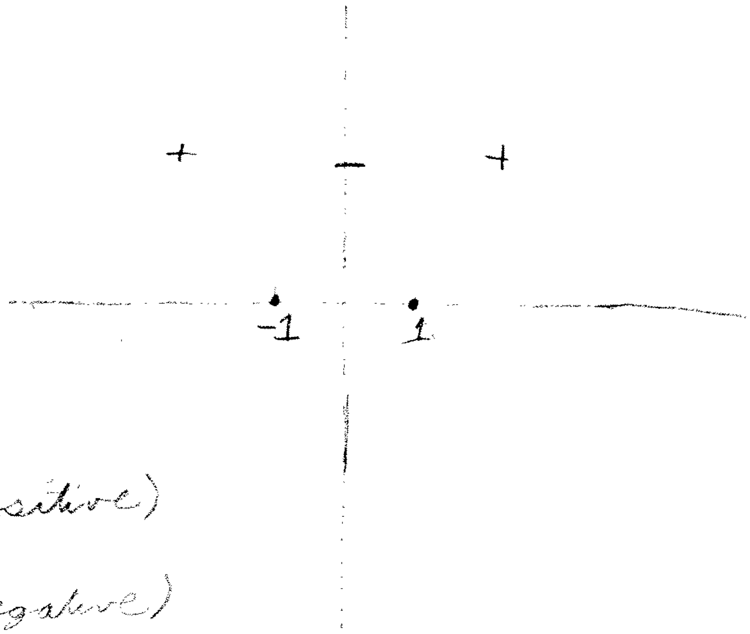
Timothy Lukowicz

Homework #11

2) $f(x) = x^4 - 6x^2 + 2x + 3$ find inflection points and when the graph is concave up and down

$f'(x) = 4x^3 - 12x + 2$

$f''(x) = 12x^2 - 12$



$f''(x) = 0$ $\quad 12x^2 - 12 = 0$

$x^2 = 1$

$x = \pm 1$

$f''(2) = 12(2)^2 - 12 = 36$ (positive)

$f''(0) = 12(0)^2 - 12 = -12$ (negative)

$f''(-2) = 12(-2)^2 - 12 = 36$ (positive

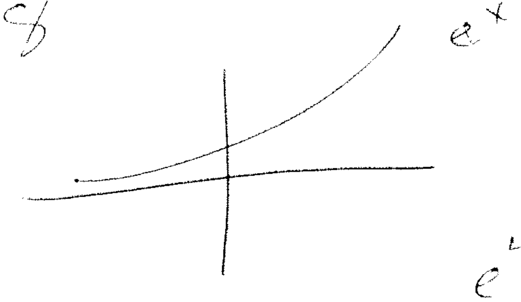
inflection points : $x = 1, -1$

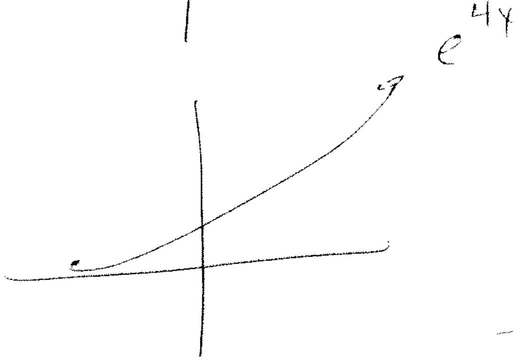
concave up : $(-\infty, -1) \cup (1, \infty)$

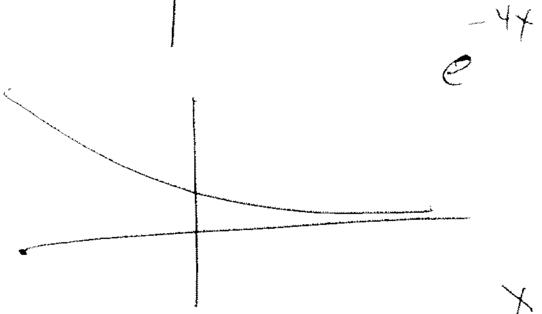
concave down : $(-1, 1)$

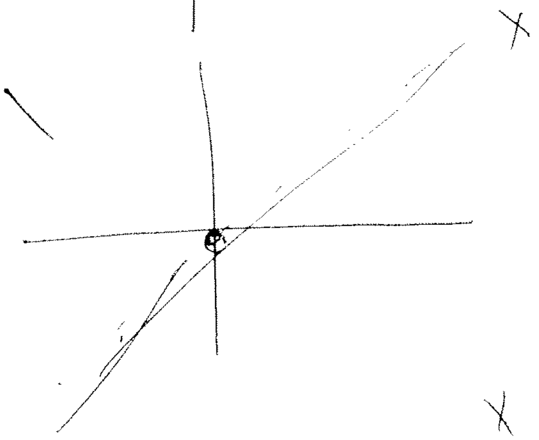
#8

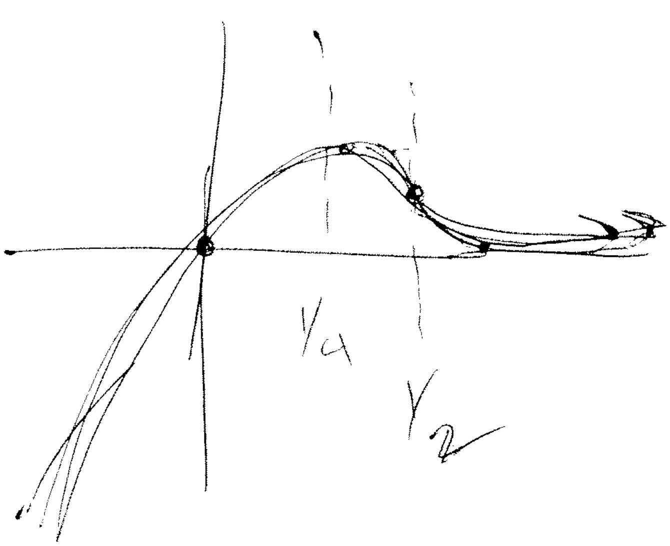
Xmas/ugly











$y = xe^{-4x}$

$y = x(-4)e^{-4x} + e^{-4x} \cdot (\cancel{1})$

$= e^{-4x}(1-4x) = 0$

$x = 1/4$ MAX

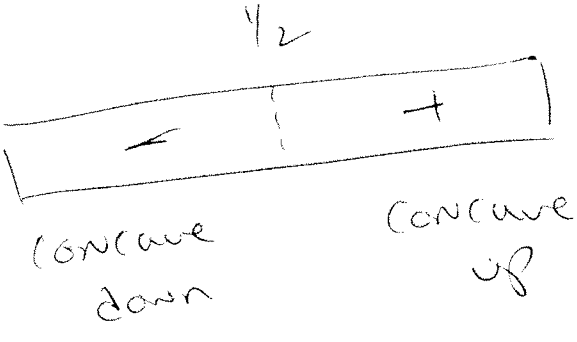
$y'' = e^{-4x}(-4) + (1-4x)(-4)e^{4}$

$= e^{-4x}(\underbrace{-4 \mp 4 \pm 16x})$

$= 0 \qquad = -8 + 16x$

$8 = 16x$

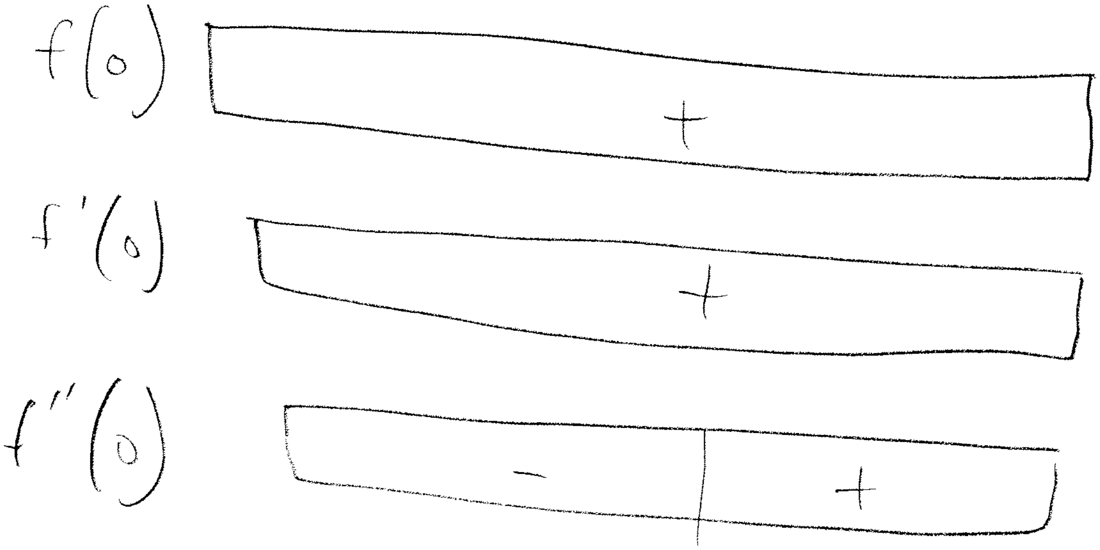
$1/2 = x$ INFLECTION POINT

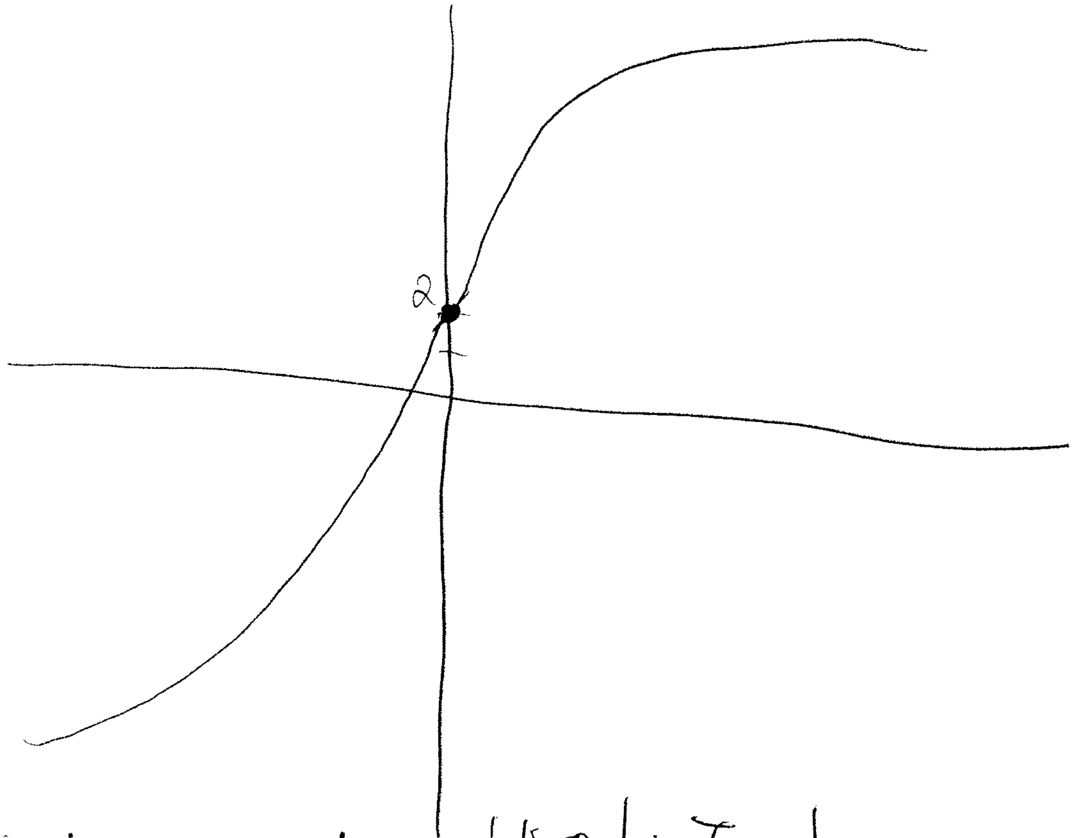


#38

MaT - Finishers

Sketch a Graph with the given properties $f(0)=2$, $f'(x)>0$ for all x, $f'(0)=1$, $f''(x)>0$ for $x<0$, $f''(x)<0$ for $x>0$



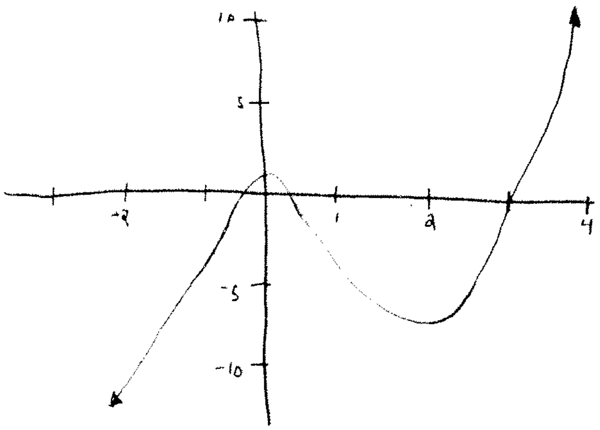


Julian Ward Hiroaki Tomioka

Section 3.5
#46

it

Grayson Rogers
Pat Wells
Mo



estimate the intervals of increase And decrease, the location of local extrema, intervals of concavity And locations of inflection points

Local max At x=0
Local min At x=2

inflection point At x=1

−	+
+	−
−	+

INVESTMENT BANKERS

3.6

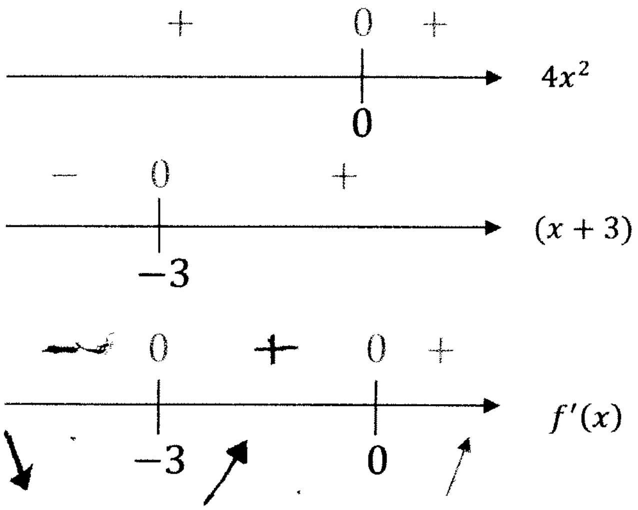
4. $f(x) = x^4 + 4x^3 - 1$

$f'(x) = 4x^3 + 12x^2$
$= 4x^2(x+3)$

$4x^2 = 0 \qquad x + 3 = 0$
$x = 0 \qquad x = -3$

$$f'(x)\begin{cases} > 0,\text{on } (0,\infty) \\ < 0, \text{on } (-\infty,-3) \text{ and } (-3,0) \end{cases}$$

LOCAL MIN: $x = -3$

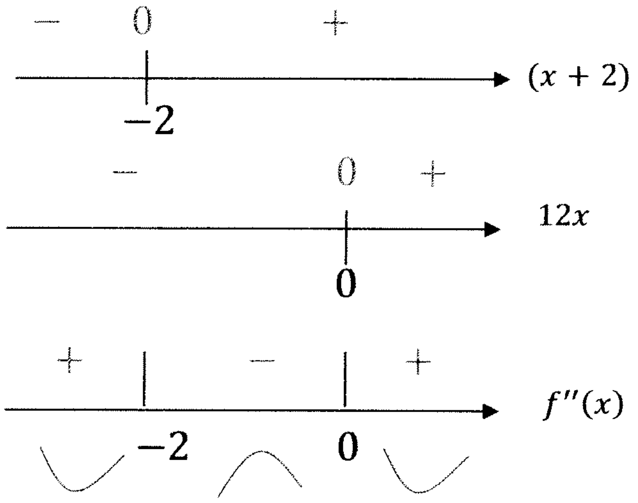


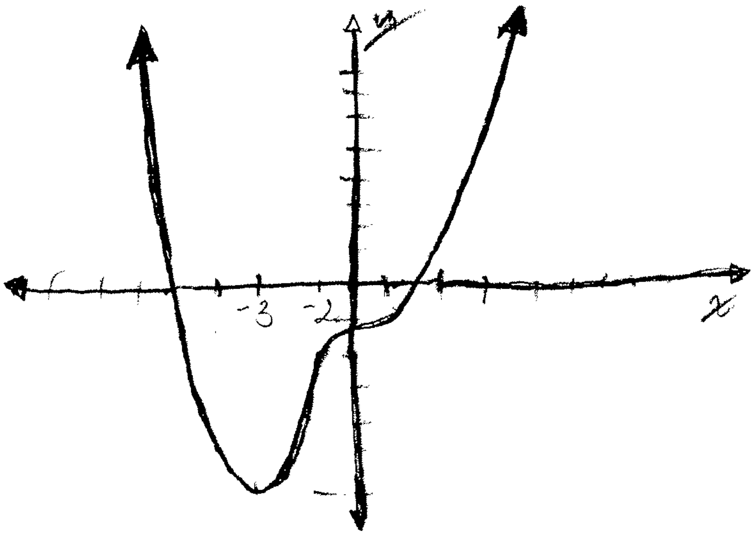
$f''(x) = 12x^2 + 24x$
$= 12x(x+2)$

$12x = 0 \qquad x + 2 = 0$
$x = 0 \qquad x = -2$

$$f''(x)\begin{cases} > 0,\text{on } (-\infty,-2) \text{ and } (0,\infty) \\ < 0, \text{on } (-2,0) \end{cases}$$

INFLECTION POINTS = $x=-2$, $x=0$

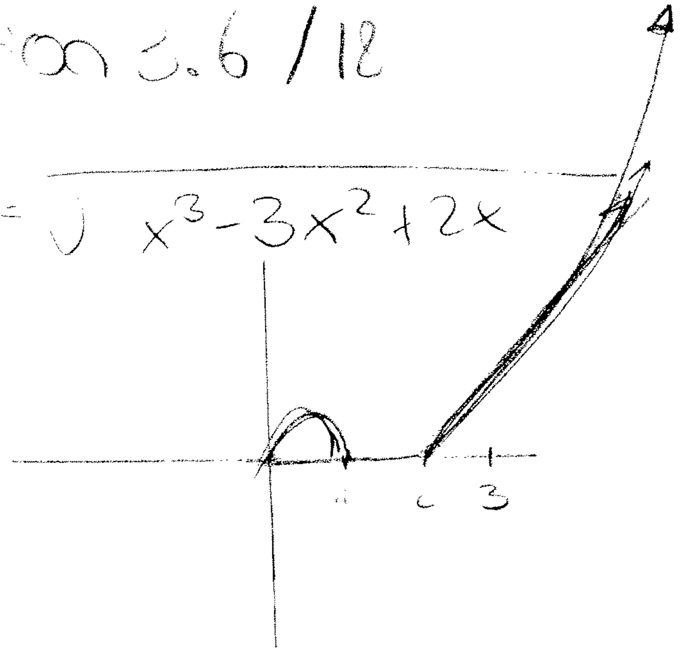




Deutsche Produktion

Section 3.6 / 12

$f(x) = \sqrt{x^3 - 3x^2 + 2x}$



$y = (\quad\text{———}\quad)^{1/2}$

$y' = \frac{1}{2}(\qquad)^{-1/2} \cdot (3x^2 - 6x + 2$

$y'' = -\frac{1}{4}(\qquad)^{-3/2}(\quad + \quad) + !$

$y = x^{3/2}$

$y' = \frac{3}{2}x^{1/2}$

$y'' = \frac{3}{4}x^{-1/2} > 0$

0 1 2

$f(x)$ | 0 + 0 | 0 + | Zeros

pos pos

0 0,5 1 2 ∞

$f'(x)$ | + | − | | + | | Turning point

inc dec inc

0 1 2 ∞

$f''(x)$ | − | | + | | Inflection Point

Concave down up

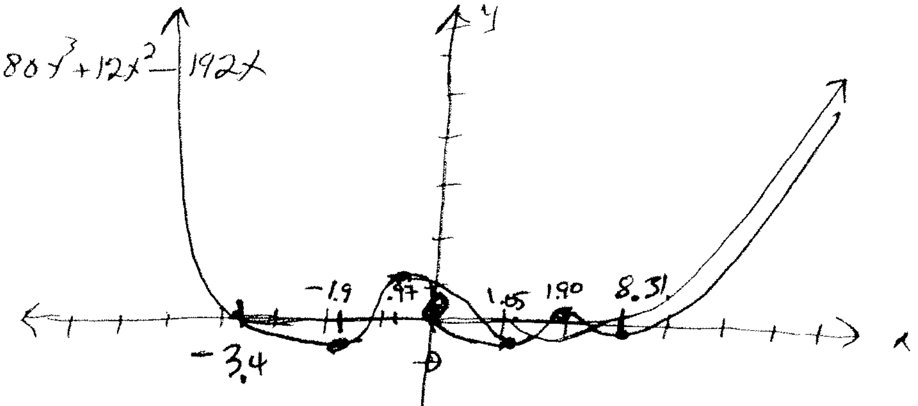
Determine All significant Features (approximatelly if necessary) and sketch a graph.

HELIX

26 $F(x) = x^6 - 10x^5 - 7x^4 + 80x^3 + 12x^2 - 192x$

Zeros: 0, 9.8...
3.4..., -3.0

$y1 = x^6 - 10x^5 - 7x^4 + 80x^3 + 12x^2 - 192x$

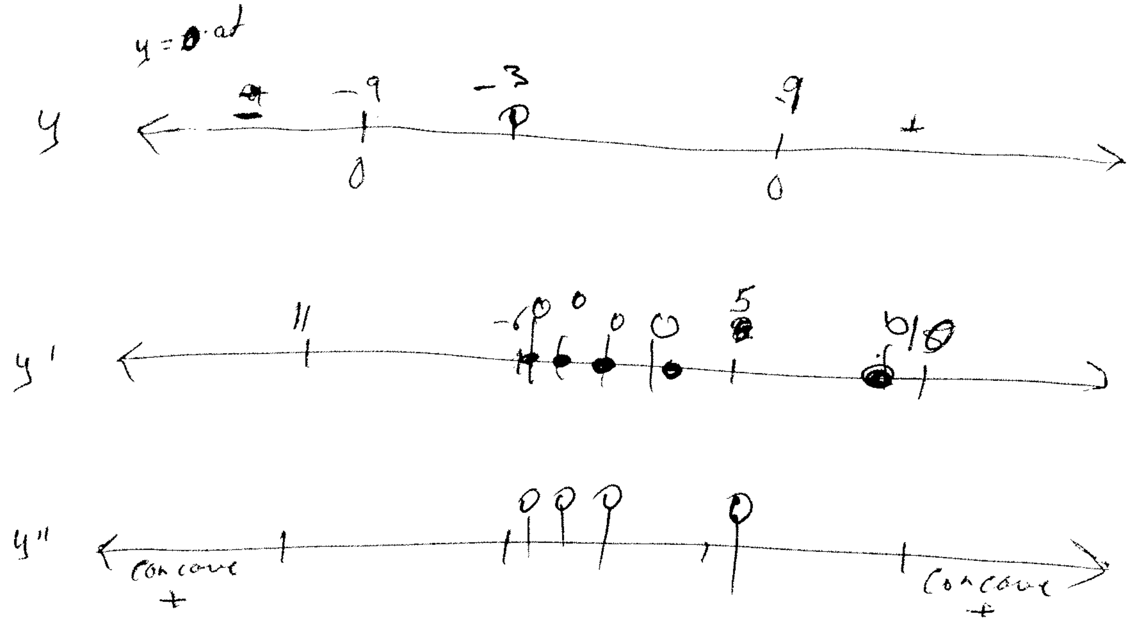


$F' = 6x^5 - 50x^4 - 28x^3 + 240x^2 + 12x - 192$

Zeros: MAX / MINS 8.31..., -1.96... 1.90..., 1.05, -.975..

$F'' = 30x^4 - 200x^3 + 84x^2 + 480x + 12$

Zeros: 5.67, 2.25
-1.24, -.025
Inflection Pts.



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Function f has a slant asym $y = mx + b \; (m \neq 0)$

If $\lim_{y \to \infty} [f(x) - mx + b] = 0$ / $\lim_{y \to -\infty} [f(x) - (mx + b = 0]$

find slant asym. (use division to write Function)
Then graph the function and its asymptote on same axes

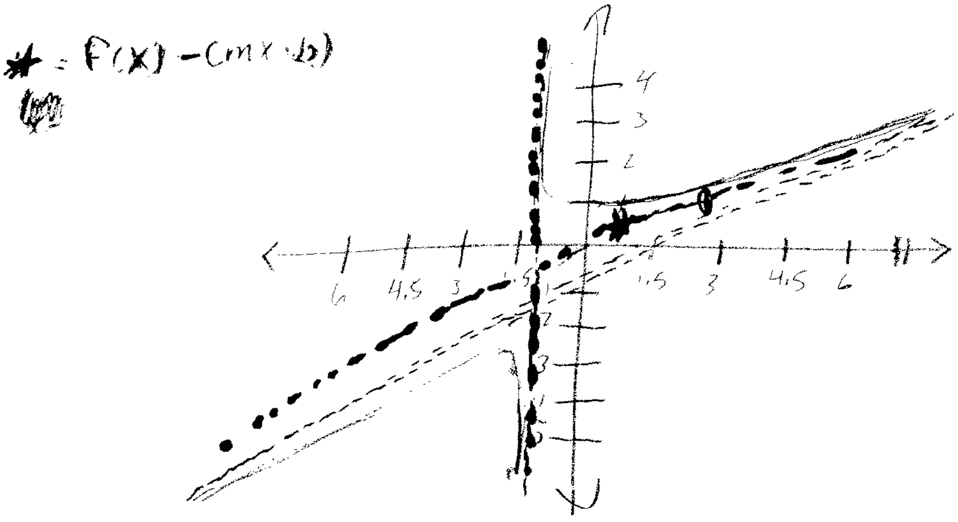
DGK
all day

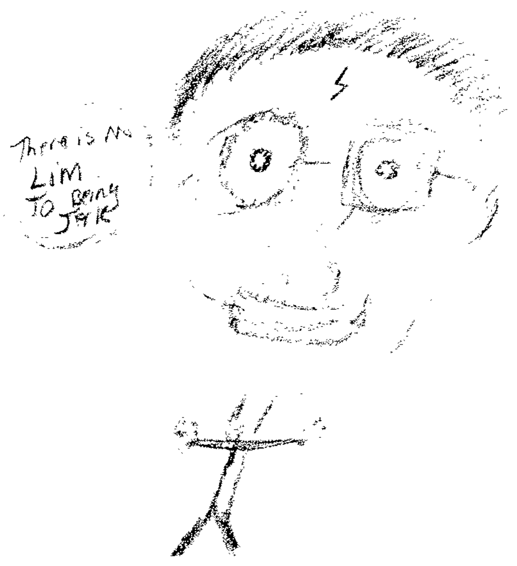
$$y = \frac{(x-\cancel{1})\,(x^2+x+1)}{(\cancel{x}-1)\,(x+1)}$$

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

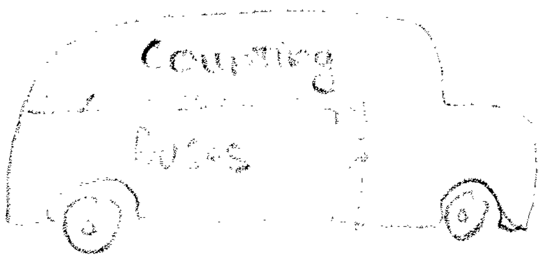
$$\begin{array}{r} x \\ x+1 \,\overline{)\, \cancel{x^2} + \cancel{x} + 1} \\ (-)\; \cancel{x^2} \cancel{+x} \\ \hline 1 \end{array} \quad = x + \frac{1}{x+1}$$

$y = x$ ← slant asymptote





Homework # 11



3.6.50 find function whose graph has the given asymptotes:

$$x = 1, \quad x = -1, \quad y = 0$$

We have: asymptotes $x = 1$, $x = -1$ and $y = 0$

So: $f(x) = \dfrac{h(x)}{g(x)}$,

From: $x = 1$, $x = -1$: asymptotes:

$\Rightarrow g(x) = (x-1)(x+1) = x^2 - 1$

From: $y = 0$ we know $h(x) < g(x)$

$$\boxed{\text{So } f(x) = \frac{ax + b}{x^2 - 1}}$$

- guess $a = 1$, $b = 2$

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

- guess $a = 0$, $b = 1$

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