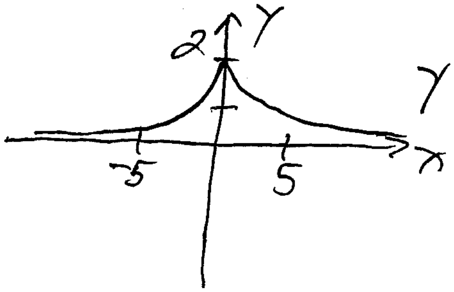
Mr. Konichek
Hmwk 4.3

4.3 Pg. 298 (1, 3, 5, 11, 15, 37, 39, 41)

1.



$y = \frac{2}{1+0.5|x|}$

horizontal asymptote at $y=0$

3. horizontal asymptote (H.A.) $y=0$
vertical asymptote (V.A.) $x=0$

5. H.A. $y=0$ V.A. $x=-1$ and $x=1$

11. $f(x) = \frac{1}{x}$ vertical asymptote $x=0$

$\lim_{x\to\infty} \frac{1}{x} = \frac{1}{\infty} = 0$ H.A. $y=0$

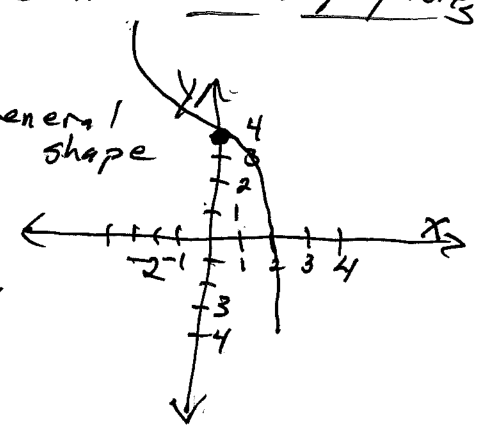
$\lim_{x\to-\infty} \frac{1}{x} = \frac{1}{-\infty} = 0$

15. $f(x) = \frac{x-2}{x+2}$ V.A. $x=-2$
H.A. $y=1$ since $\lim_{x\to\pm\infty} \frac{1-\frac{2}{x}}{1+\frac{2}{x}} = 1$

37. $g(x) = 4-3x-2x^3$ polynomials have no asymptotes

$g'(x) = -6x^2-3$
$-3(2x^2+1) = 0$
no critical pts. $x^2 = -\frac{1}{2}$
Thus no Extrema
$x = \sqrt{-\#}$ no real #

general shape



$g''(x) = -12x$
$-12x = 0$
$x = 0$

$g(0) = 4$
(0, 4) is an inflection pt.

$\cup$ $\cap$
(-1) 0 (+1)
+ −

Mr. Koncchek
HmwK 4.3 cont.

Cont. 4.3 39, 41 Pg. 298

39. $h(x) = x^3 - 3x + 1$

Note: polynomials have no asymptotes

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

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

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

$x = -1$ and $x = 1$

$h(1) = 1 - 3 + 1 = -1$

$h(-1) = -1 + 3 + 1 = 3$

so critical pts. $(1,-1)$ and $(-1,3)$

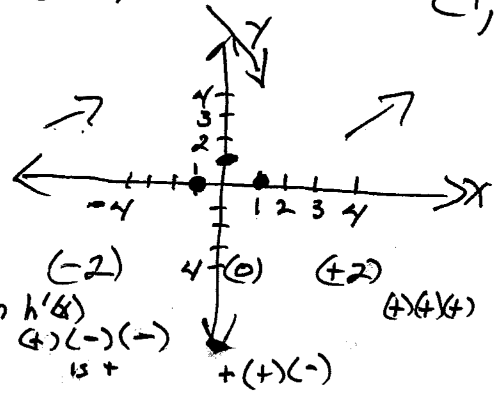
$h''(x) = 6x$

$6x = 0$

$x = 0$

$h(0) = 1$

so inflection pT. at $(0,1)$



Test pTs. in $h''(x)$

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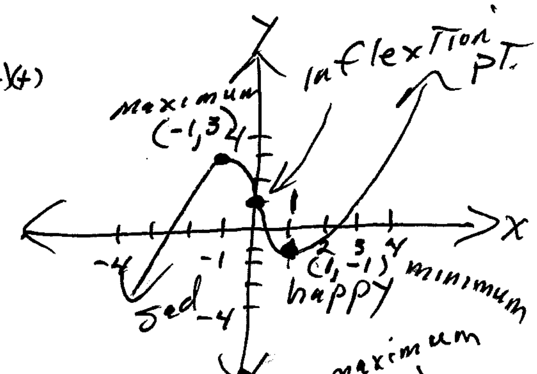
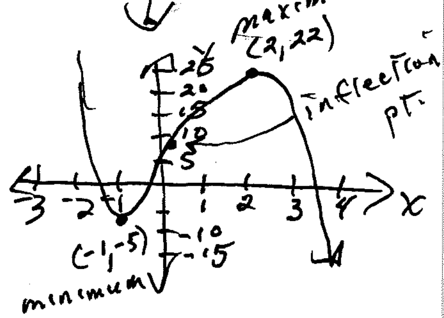
(-1) 0 (+1)

− +





41. $f(x) = -2x^3 + 3x^2 + 12x + 2$

$f'(x) = -6x^2 + 6x + 12$

$-6(x^2 - x + 2) = 0$

$(x-2)(x+1) = 0$

$x = 2$ and $x = -1$

↘ | ↗ | ↘

(-2) -1 (0) 2 (3)

− − −   − − +   − + +

$f(2) = -2(2)^3 + 3(2)^2 + 12(2) + 2$

$-16 + 12 + 24 + 2 = 22$

$f(-1) = -2(-1)^3 + 3(-1)^2 + 12(-1) + 2$

$+2 + 3 - 12 + 2 = -5$

so critical pts at $(2,22)$ and $(-1,-5)$

∪ | ∩

(0) 1/2 (1)

$f''(x) = -12x + 6$

$6(-2x+1) = 0$

$x = \frac{1}{2}$

$f(\frac{1}{2}) = -2(\frac{1}{2})^3 + 3(\frac{1}{2})^2 + 12(\frac{1}{2}) + 2$

$-\frac{1}{4} + \frac{3}{4} + 6 + 2$

$(\frac{1}{2}, 8\frac{1}{2})$ inflection pT.