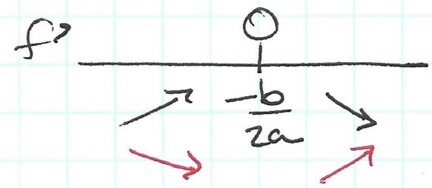
DAY 64 HW p. 202–204 # 27, 38, 40, 41

(27) $f(x) = ax^2 + bx + c$ a, b, c are constants.

$f'(x) = 2ax + b = 0$

$2ax = -b$

C.P. ∴ $\boxed{x = \frac{-b}{2a}}$



& $f\left(\frac{-b}{2a}\right)$ is a max if $a>0$

& $f\left(\frac{-b}{2a}\right)$ is a min if $a<0$

(38) $y = \frac{x^3}{1+x^4}$

$f'(x) = \frac{(1+x^4)(3x^2)-(x^3)(4x^3)}{(1+x^4)^2}$

$f'(x) = \frac{3x^2+3x^6-4x^6}{(1+x^4)^2}$

$f'(x) = \frac{-x^6+3x^2}{(1+x^4)^2}$

$\frac{-x^2(x^4-3)}{(1+x^4)^2}$

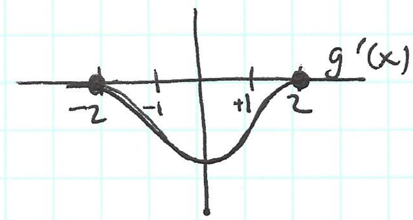
numerator $(-x^2)(x^2-\sqrt{3})(x^2+\sqrt{3})$

$f'(x) = \frac{-(x^2)(x-\sqrt[4]{3})(x+\sqrt[4]{3})(x^2+\sqrt{3})}{(1+x^4)^3}$

$x = \sqrt[4]{3}$ $x = -\sqrt[4]{3}$

MIN $(-\sqrt[4]{3}, -.5698)$ MAX $(+\sqrt[4]{3}, +.5698)$

(40)



a) g(x) is decreasing on [-2, 2] b/c $g'(x) < 0$

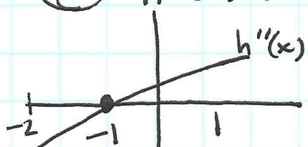
b) g(x) has a point of inflection at (0, g(0)) b/c g'(0) is a minimum extrema value & g'' changes signs ⊖ to ⊕.

c) g(-2) is a global max
g(2) is a global min.

d) $g(-2) = 5$
then $g(0) < 5$ and $g(2) < g(0)$ because $g'(x) < 0$ on [-2, 2] and g(x) is always decreasing

(41) $h''(x)$ on [-2, 1]

$h''(-1) = 0$
$h'(-1) = 0$
$h(-1) = 2$



THINKING:
$h'' < 0$ $x < -1$ ∴ h(x) ccd & h' decreasing
$h'' > 0$ $x > -1$ ∴ h(x) ccu & h' increasing

a) Since $h'(-1) = 0$ and h' decreasing on (-2, -1) & then increasing on (-1, 1) ∴ h'(x) is never negative.

b) h(1) is global max b/c h(x) is ccup & h'(x) is increasing on (-1, 1) so h(x) is increasing at an increasing rate so h(1) will be a max.

c) possible graph