Ex. 1

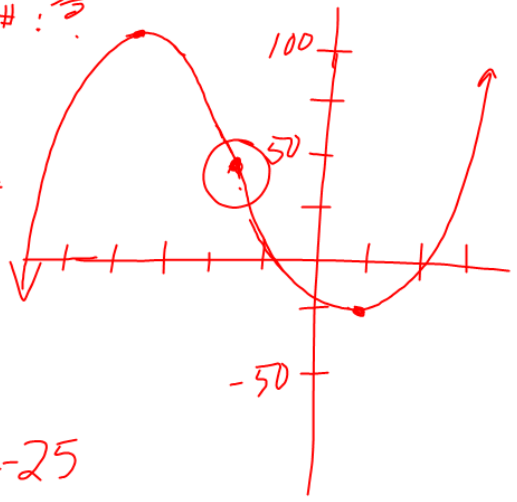
$f(x) = 2x^3 + 9x^2 - 24x - 10$

$f'(x) = 6x^2 + 18x - 24 \rightarrow$ crit. #'s: $1, -4$ $= 6(x+4)(x-1)$

$f''(x) = 12x + 18 \rightarrow$ crit #: $-\frac{3}{2}$

$f'(x)$: + 0 — 0 + ; -4 (max), 1 (min)

$f''(x)$: — 0 + ; $-\frac{3}{2}$



$f(-4) = 102 \quad f\left(-\frac{3}{2}\right) = 39.5 \quad f(1) = -25$

ex 2

$f'(x)$ — $4x^3 - 12x$ ←
— $4x(x^2-3)$
— $4x(x+\sqrt{3})(x-\sqrt{3})$

$x^2 - 3 = 0$
$x^2 = 3$
$x = \pm\sqrt{3}$

$f''(x) = 12x^2 - 12$
$12(x^2-1)$
$12(x+1)(x-1)$

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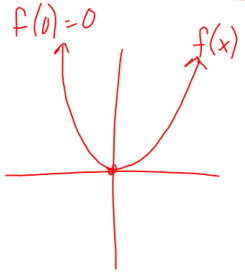
ex 3

$f(x) = x^4$
$f'(x) = 4x^3 \rightarrow x = 0$
$f''(x) = 12x^2 \rightarrow x = 0$

$f'(x)$ ← — 0 + →
0
min

$f''(x)$ ← + 0 + →
0

$f(0) = 0$



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ex 4

$f(x) = x^4 - 8x^2 + 10$
$f'(x) = 4x^3 - 16x \rightarrow$ crit #'s $x = -2, 0, 2$
$f''(x) = 12x^2 - 16$

$f''(-2) = 32 > 0$ local min.
$f''(0) = -16 < 0$ local max
$f''(2) = 32 > 0$ local min.

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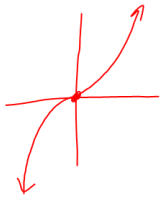
ex 5

$f(x) = x^3$
$f'(x) = 3x^2 \rightarrow$ crit #: $0 = x$
$f''(x) = 6x$
$f''(0) = 0$ ↓ crit # $x = 0$

$f'(x)$ ← + 0 + →
.0

$f''(x)$ ← — 0 + →
0

$f(0) = 0$



ex.6 $f(x) = x + \frac{25}{x}$

ex7 $f(x) = (x+2)^{\frac{1}{5}} + 4$