	Determine the intervals of concavity and the inflection points
	A) $f(x)=x^{2/5}$

$f'(x) = \frac{2}{5} x^{-3/5}$

$f''(x) = \frac{-6}{25} x^{-8/5}$

$0 = \boxed{\frac{-6}{25(x)^{8/5}}}$

$f''=0$	f'' und
$-6 \neq 0$	$x=0$
	P.I.P.S

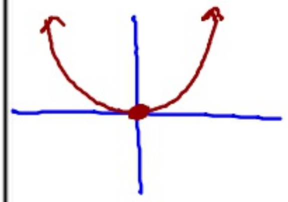
$f''(-1) = \frac{-6}{25(-1)^{8/5}} < 0$

$f(x)$ concave down $(-\infty, 0)$

$f''(1) = \frac{-6}{25} < 0$

$f(x)$ concave down $(0, \infty)$

Local Extrema and the 2^{nd} Derivative



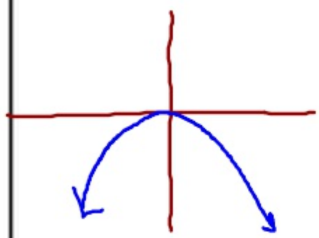
Determine the local extrema using the second derivative test

A) $y = x^2$

$y' = 2x$ $\quad$ $y'' = 2 > 0$ $\quad$ y concave up

C.P. $\quad 2x = 0$

$\boxed{x = 0 \quad \text{local min b/c} \quad y''(0) > 0}$



B) $y = -x^2$

$y' = -2x$ $\quad$ $y'' = -2 < 0$ $\quad$ y concave down

C.P $\quad -2x = 0$

$\boxed{x = 0 \quad \text{Local Max b/c} \quad y''(0) < 0}$

At a C.P. if $f(x)$ concave down local max

At a C.P if $f(x)$ concave up local min

① Find C.P.

② Plug C.P. into 2^{nd} derivative

Determine the local extrema using the second derivative test

25) $f(x) = x^3 - 12x^2 + 45x$

$f'(x) = 3x^2 - 24x + 45$ $\quad$ $f''(x) = 6x - 24$

$0 = 3x^2 - 24x + 45$

$0 = x^2 - 8x + 15$

$0 = (x-5)(x-3)$

$x = 5 \quad x = 3$

$f''(3) = -6 < 0$

f concave down $\quad x = 3$ $\quad$ local max

$f''(5) = 6 > 0$

f concave up $\quad x = 5$ $\quad$ local min

27) $f(x) = 3x^4 - 8x^3 + 6x^2$

$f'(x) = 12x^3 - 24x^2 + 12x$ $\quad$ $f''(x) = 36x^2 - 48x + 12$

$0 = 12x(x^2 - 2x + 1)$

$0 = \boxed{12x(x-1)(x-1)}$

C.P. $\quad x = 0 \quad x = 1$

$f''(0) = +12 > 0$

f concave up $\quad x = 0$ $\quad$ local min

$f''(1) = 0 \quad x = 1 \quad$ P.I.P's

local min

$f'(\frac{1}{2}) = 6(-\frac{1}{2})(-\frac{1}{2}) > 0$ $\quad$ f inc $(0, 1)$

$f'(2) = 24(1)(1) > 0$ $\quad$ f inc $(1, \infty)$

	Determine the local extrema using the second derivative test 31) $f(x)=6x^{3/2}-4x^{1/2}$ 5) $f(x)=10x^3-x^5$

What you'll Learn About
How to describe the key features of a graph using the 1st and 2nd derivative

Absolute Extrema

$f(-2) = 16 + 24 - 3 = 37$

$f(0) = -3$

$f(2) = -16 + 24 - 3 = 5$

$f(5) = -250 + 150 - 3 = -103$

Critical Points

$f(-2) = 37$ Abs max

$f(5) = -103$ Abs min

2) $f(x) = -2x^3 + 6x^2 - 3$ $[-2, 5]$

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

$0 = -6x^2 + 12x$

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

$x = 0$ $x = 2$

$f'(-1) = -18 < 0$

f dec $(-\infty, 0)$

$f'(1) = 6 > 0$

f inc $(0, 2)$

$f'(3) = -18 < 0$

f dec $(2, \infty)$

$x = 0$ local min b/c f' changes from neg to pos

$x = 2$ local max b/c f' changes from pos to neg

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

$0 = -12x + 12$

$x = 1$

$f''(0) = 12 > 0$

f concave up $(-\infty, 1)$

$x = 0$ local min

$f''(2) = -12 < 0$

f concave down $(1, \infty)$

$x = 2$ local max