f(x) Compared to its First Derivative

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

local maximum

local minimum

inflection point

local minimum

$f'(x) = 6x^5 - 15x^4 + 18x^2 - 6x - 3$
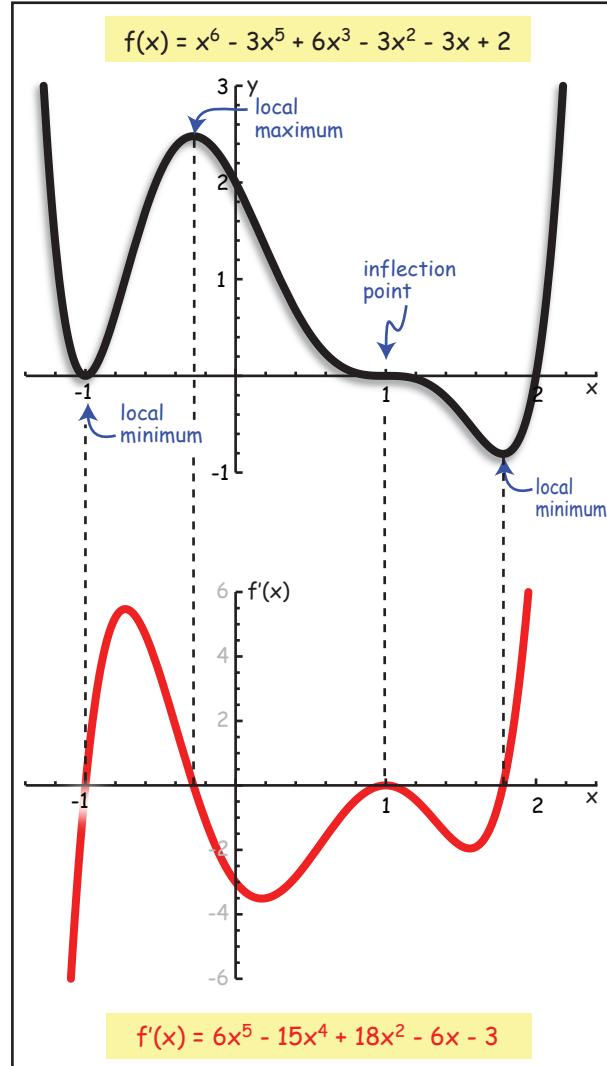
f(x) Compared to its Second Derivative

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

inflection points (4)

concave up | concave down | concave up | concave down | concave up

4 zeros in the second derivative graph

$f''(x) = 30x^4 - 60x^3 + 36x - 6$
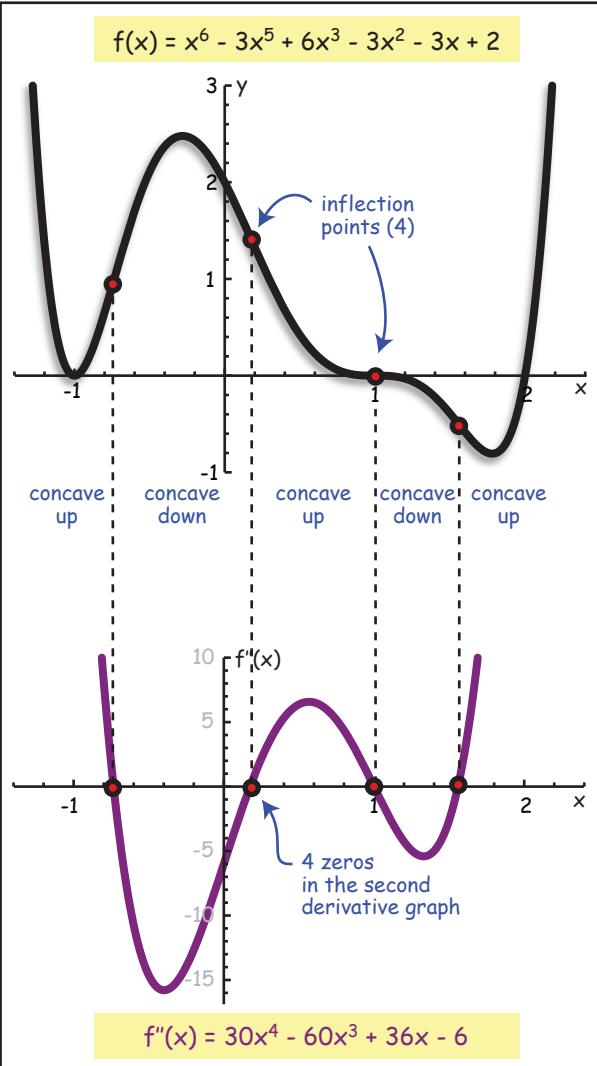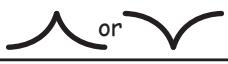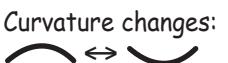
graph feature		f(x)	f'(x)	f''(x)	Notes
rising (L to R)		slope > 0	+		
falling (L to R)		slope < 0	−		
extrema	maximum	slope = 0	= 0 + on L − on R	− at x_{max}	derivative may not exist at a max or min, e.g. ⌒ or ⌄
	minimum	slope = 0	= 0 − on L + on R	+ at x_{min}	
inflection pt.		Curvature changes: ⌒ ↔ ⌣		= 0 potential inflection point	
concave up	⌣ ⌣	− +		+	
concave down	⌒ ⌒	+ −		−	