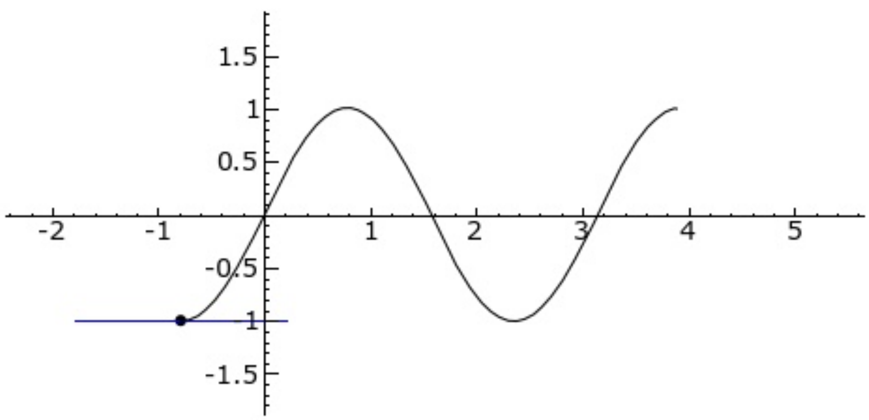
Inflection point

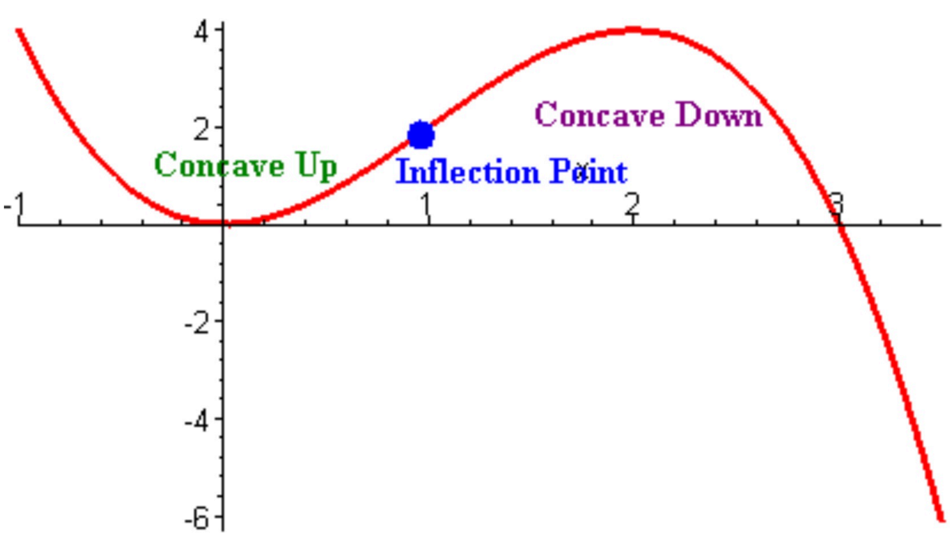
Page issues

文A

In differential calculus, an **inflection point**, **point of inflection**, **flex**, or **inflection** (British English: **inflexion**) is a point on a continuously differentiable plane curve at which the curve crosses its tangent, that is, the curve changes from being concave (concave downward) to convex (concave upward), or vice versa.



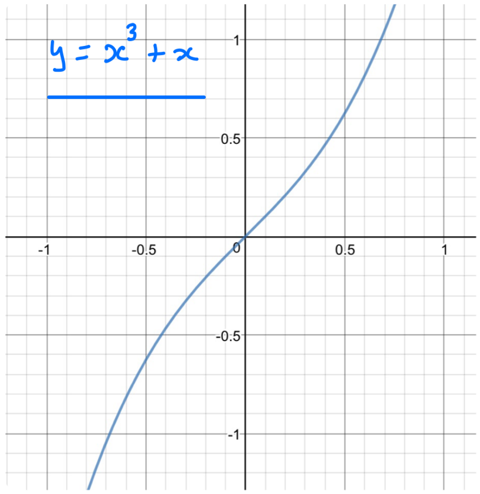
Inflection Points. An Inflection Point is where a curve changes from Concave upward to Concave downward (or vice versa). So what is concave upward / downward ?



$$\frac{dy}{dx} = 3x^2 + 1$$

At $x = 0$

$$\frac{dy}{dx} = 3(0)^2 + 1 = 1$$



$$\frac{d^2y}{dx^2} = 6x$$

At $x = 0$

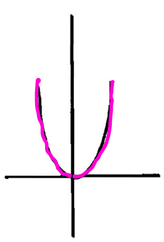
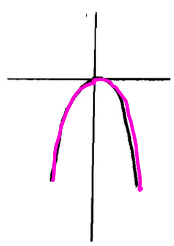
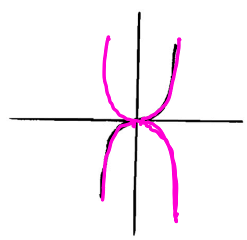
$$\frac{d^2y}{dx^2} = 6(0) = 0$$

At $x = -0.1$

$$\frac{d^2y}{dx^2} = -0.6 < 0$$

At $x = +0.1$

$$\frac{d^2y}{dx^2} = +0.6 > 0$$

	$y = x^4$	$y = -x^4$	$y = x^3$
	$\frac{dy}{dx} = 0$	$\frac{dy}{dx} = 0$	$\frac{dy}{dx} = 0$
	$\frac{d^2y}{dx^2} = 0$	$\frac{d^2y}{dx^2} = 0$	$\frac{d^2y}{dx^2} = 0$
			
	A minimum	A maximum	A point of inflection
$\frac{d^2y}{dx^2}$	$+\ 0\ +$	$-\ 0\ -$	$-\ 0\ +\quad +\ 0\ -$

Summary

At a point of inflection on the curve y=f(x):

1. $\dfrac{d^2y}{dx^2} = 0$

2. $\dfrac{d^2y}{dx^2}$ changes sign as curve passes through (either $- \; 0 \; +$ or $+ \; 0 \; -$)