Stationary Points $\frac{dy}{dx} = 0$

Maximum

$$\frac{dy}{dx} = 0$$

$$\frac{dy}{dx} > 0 \qquad \frac{dy}{dx} < 0$$

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

Minimum

$$\frac{dy}{dx} < 0 \qquad \frac{dy}{dx} > 0$$
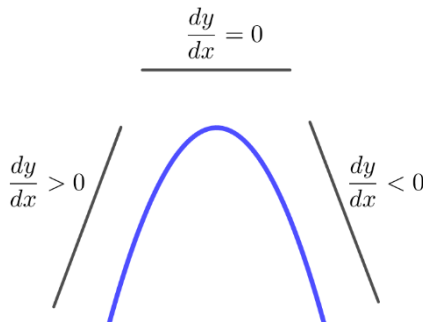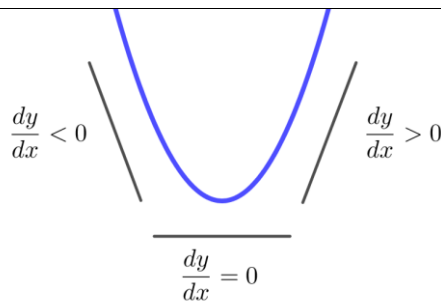
$$\frac{dy}{dx} = 0$$

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

Point of Inflexion

$$\frac{dy}{dx} = 0 \qquad \frac{dy}{dx} > 0 \qquad \frac{dy}{dx} < 0 \qquad \frac{dy}{dx} = 0$$
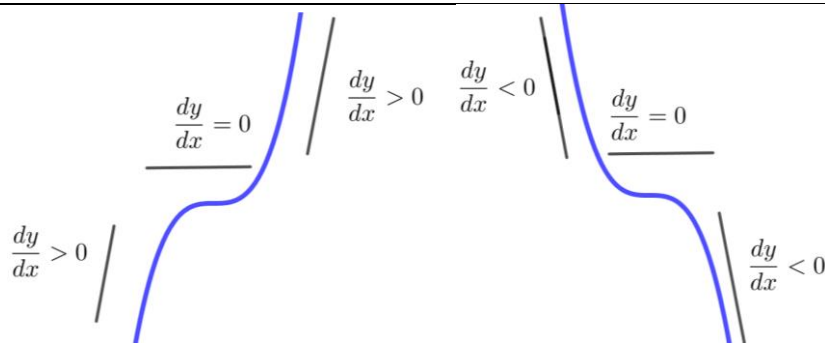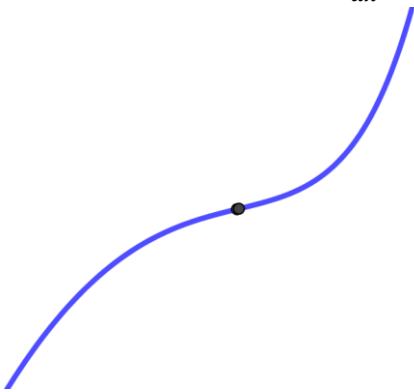
$$\frac{dy}{dx} > 0 \qquad\qquad \frac{dy}{dx} < 0$$

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

All stationary points of inflexion have $\frac{d^2y}{dx^2} = 0$ but this is not a test for a point of inflexion (e.g. y = x⁴)

Test

Solve $\frac{dy}{dx} = 0$

$\left\{ \begin{array}{l} \end{array} \right.$

If $\frac{d^2y}{dx^2} < 0$ …then local maximum

If $\frac{d^2y}{dx^2} > 0$ …then local minimum

If $\frac{d^2y}{dx^2} = 0$ …we cannot say… check $\frac{dy}{dx}$ before & after

INTHINKING

Non-Stationary Point of Inflexion $\frac{dy}{dx} \neq 0$, $\frac{d^2y}{dx^2} = 0$

$$\frac{dy}{dx} \neq 0 \text{ and } \frac{d^2y}{dx^2} = 0$$