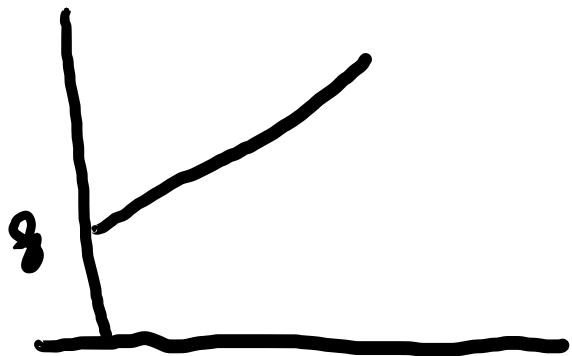


RICHIAMI MATEMATICI

A. FUNZIONI

$$y = f(x) \quad Z = f(x, y)$$

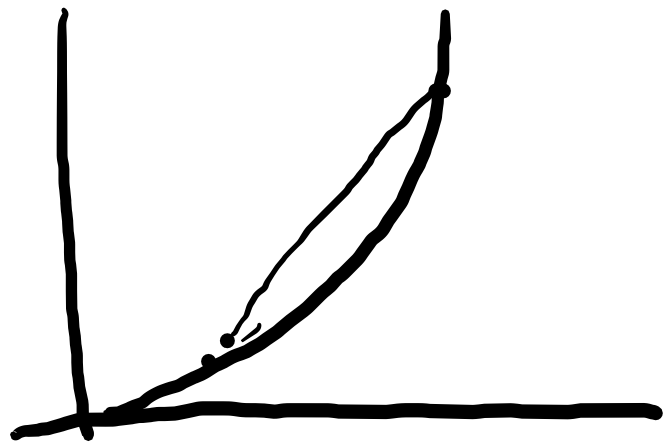
LINEARI $y = 8 + 2x$



$$f' = 2 \quad f'' = 0$$



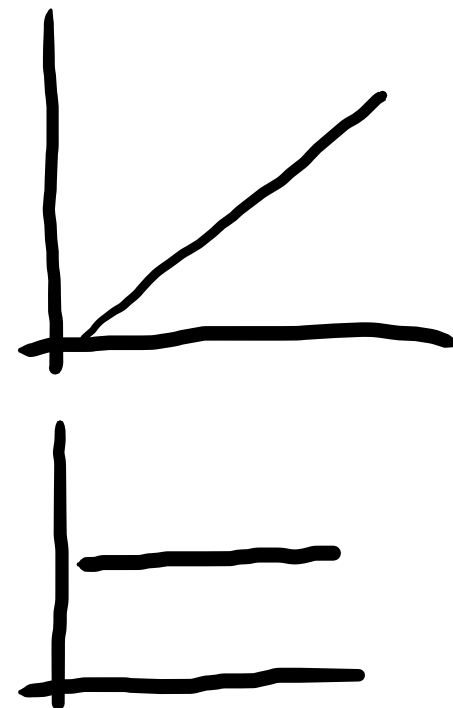
CONVEXE



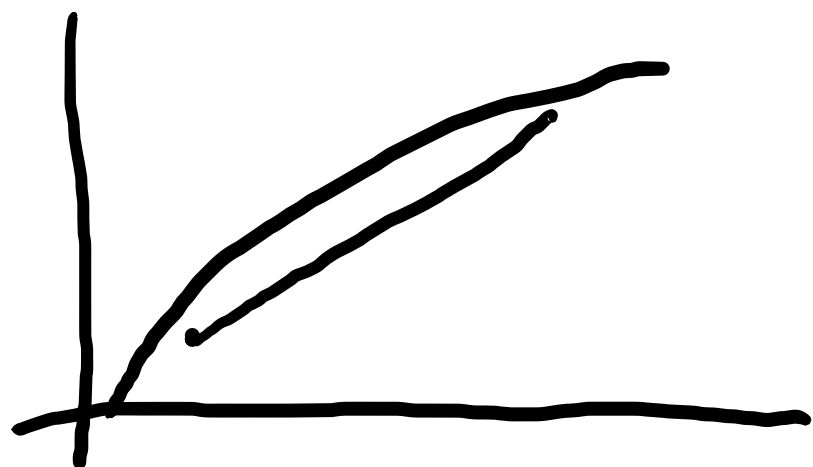
$$y = x^2$$

$$y' = 2x$$

$$y'' = 2$$



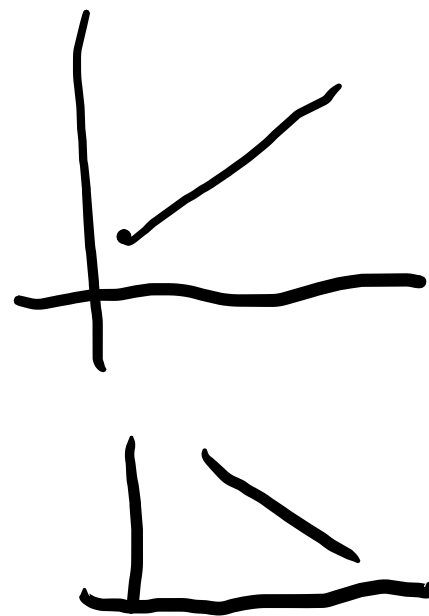
CONCAVE



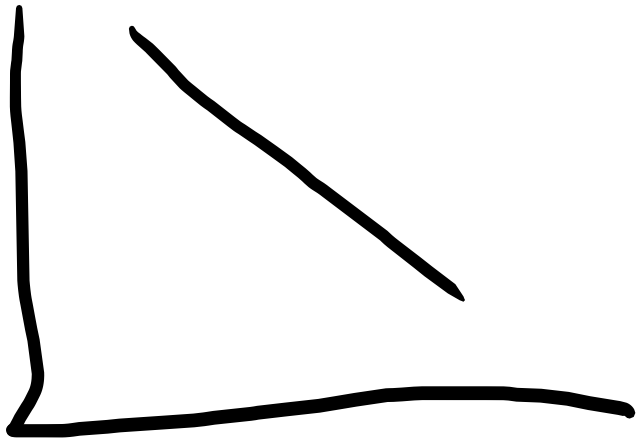
$$y = 2 + 7\sqrt{x}$$

$$y' = \frac{7}{2} x^{-\frac{1}{2}}$$

$$y'' = -\frac{7}{4} x^{-\frac{3}{2}}$$



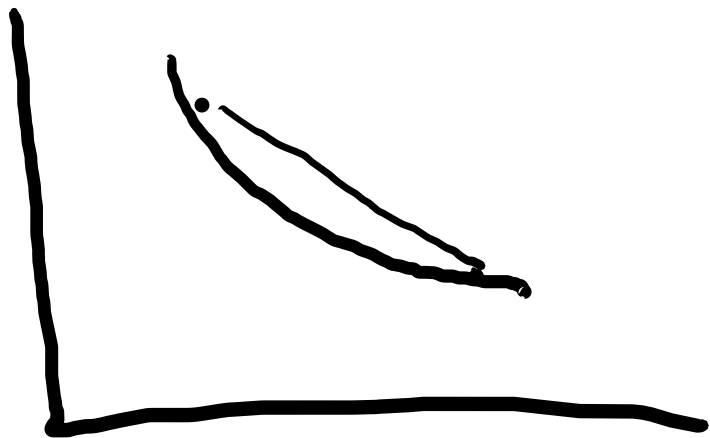
DECLINING



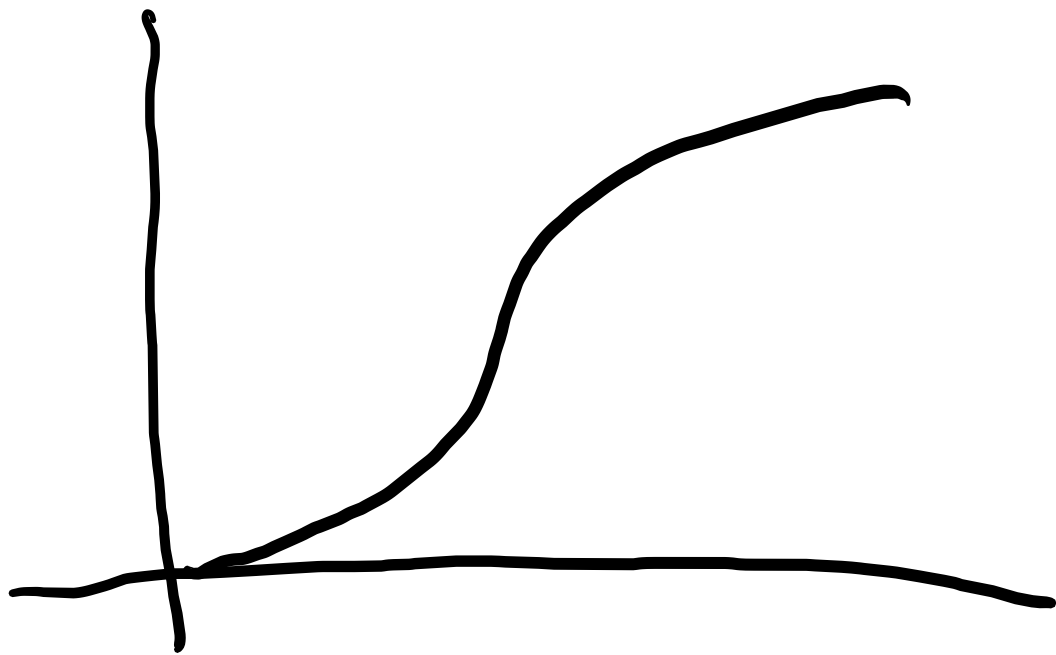
$$f' < 0$$
$$f'' = 0$$



$$f' < 0$$
$$f'' > 0$$



$$f' < 0$$
$$f'' < 0$$



$$TC = 150 + 15Q + 0.5Q^2$$

$$MC = 15 + Q$$

$$AC = \frac{150}{Q} + 15 + 0.5Q$$

2. DERIVATE (REGOLE)

$$y = a x^b$$

$$\frac{dy}{dx} = b a x^{b-1}$$

$$y = \frac{a}{x}$$

$$\frac{dy}{dx} = -\frac{a}{x^2}$$

$$a x^{-1} = -a x^{-2}$$

PRODOTTO

$$y = f(x) \cdot g(x)$$

$$\frac{dy}{dx} = f'(x) \cdot g(x) + f(x) \cdot g'(x)$$

Es. $y = x^2 \ln x \rightarrow 2x \ln x + x^2 \cdot \frac{1}{x}$

IMPLICITA

$$y = f(z), \quad f(z) = g(x)$$

$$\frac{dy}{dx} = \frac{dy}{dz} \cdot \frac{dz}{dx}$$

Es $y = z^2, \quad z = 2x + C$

$$\begin{aligned} \frac{dy}{dx} &= 2z \cdot 2 = 2(2x + C) \\ &= 4x + 2C \end{aligned}$$

3. MASSIMI

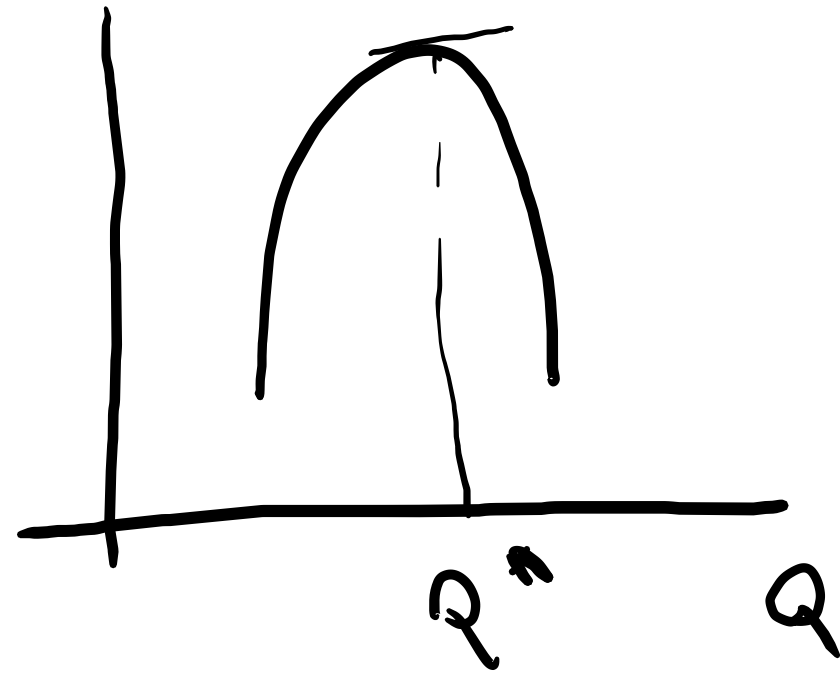
Q. LIBERO

$$\pi = TR(Q) - TC(Q)$$

$$\frac{d\pi}{dQ} = MR - MC = 0$$

⇓

$$MR = MC$$



MAX VINCOLATO

OTTIMO del CONSUMATORE

$$\text{Max } U(x, y)$$

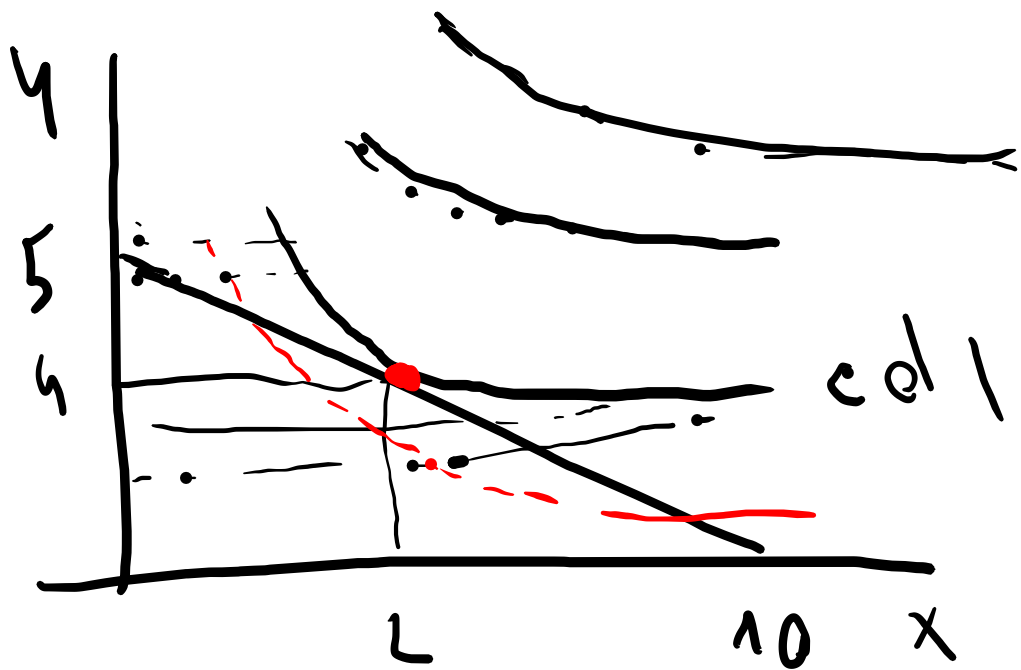
$$\text{s.t. } R = P_x X + P_y Y$$

$$R = 10, P_x = 1, P_y = 2$$



$$X = \frac{R}{P_x} - \frac{P_y}{P_x} Y$$

$$\frac{dx}{dy} = - \frac{P_y}{P_x} = 2$$



$$U = f(x, y) = x \cdot y$$

$$\frac{dx}{dy} = -\frac{P_x}{P_y}$$

$$dU = 0 = \frac{\partial U}{\partial x} \Delta x +$$

$$\frac{\Delta x}{\Delta y} = \frac{f'_x}{f'_y} \frac{\partial U}{\partial y} \Delta y = 0$$

incl col. = $\frac{f'_x}{f'_y} = \frac{y}{x} = -\frac{P_x}{P_y} = 2 = \text{incl vincolo}$

FOC

$$\begin{cases} \frac{4}{x} = 2 \rightarrow 4 = 2x \\ 10 = x + 2y \end{cases}$$

$$10 = x + 4x \Rightarrow x = 2$$

$$y = 4$$

