Worksheet: Concave and Convex Functions

ECON 441: Introduction to Mathematical Economics — Instructor: Div Bhagia

Find $f''(x)$ for each function, and decide whether f is strictly concave, strictly convex, or neither.

(a) $f(x) = -x^2 + 4x + 1$

(b) $f(x) = \ln x, \quad x > 0$

(c) $f(x) = x^4 - 4x^3$. If f is neither, on what interval is it concave?

Given the quadratic profit function

$$\pi(Q) = hQ^2 + jQ + k$$

what parameter restrictions are called for to reflect the following assumptions?

(a) If nothing is produced, the profit will be negative (because of fixed costs).

(b) The profit function is strictly concave ($\pi''(Q) < 0$ for all Q).

(c) The maximum profit occurs at a positive output level Q^*.