

HOMework 0

Econ 501: Macroeconomic Analysis and Policy

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1. Determine the concavity/convexity of $f(x) = -\frac{1}{3}x^2 + 8x - 3$
2. Let $f(x) = Ax^\alpha$, where $A > 0$ and α are parameters. For what values of α is f (which is twice differentiable) non-decreasing and concave on the interval $[0, \infty)$?
3. A competitive firm receives the price $p > 0$ for each unit of its output, and pays the price $w > 0$ for each unit of its single input. Its output from using x units of the variable input is $f(x) = x^{\frac{1}{4}}$. Is this production function concave? Is the firm's profit concave in x ?
4. A firm uses two inputs to produce a single output. Its production function f is homogeneous of degree 1. An implication of the homogeneity of f , which you are not asked to prove, is that the partial derivatives f'_x and f'_y with respect to the two inputs are homogeneous of degree zero. Use Euler's theorem to find an expression for the cross partial derivative $f''_{xy}(x, y)$ in terms of x , y , and $f''_{xx}(x, y)$.
5. Determine whether or not each of the following functions is homogeneous, and if so of what degree.
 - a. $2x^2 + xy$
 - b. $x^2 + x^3$
 - c. $g[(x_1, x_2, \dots, x_n)]^p$, where g is homogeneous of degree n .