Homework 9 Problems

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

Exercise 11.2

Find the extreme value(s) of each of the following four functions, and determine whether they are maxima or minima:

1. $z = x^2 + xy + 2y^2 + 3$
2. $z = -x^2 - y^2 + 6x + 2y$
3. $z = ax^2 + by^2 + c$; consider each of the three subcases:

   (task [a]) $a > 0, b > 0$ (task [b]) $a < 0, b < 0$ (task [c]) a and b opposite in sign

4. $z = e^{2x} - 2x + 2y^2 + 3$
5. Consider the function $z = (x-2)^4 + (y-3)^4$.
   (a) Establish by intuitive reasoning that z attains a minimum $(z^* = 0)$ at $x^* = 2$ and $y^* = 3$.
   (b) Is the first-order necessary condition satisfied?
   (c) Is the second-order sufficient condition satisfied?