Homework 10 Problems

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

Exercise 12.2

1. Use the Lagrange-multiplier method to find the stationary values of z.
   (a) $z = xy$, subject to $x + 2y = 2$.
   (b) $z = x(y + 4)$, subject to $x + y = 8$.
   (c) $z = x - 3y - xy$, subject to $x + y = 6$.
   (d) $z = 7 - y + x^2$, subject to $x + y = 0$.
2. In Prob. 1, find whether a slight relaxation of the constraint will increase or decrease the optimal value of z. At what rate?
3. Write the Lagrangian function and the first-order condition for stationary values (without solving the equations) for each of the following:
   (a) $z = x + 2y + 3w + xy - yw$, subject to $x + y + 2w = 10$.
   (b) $z = x^2 + 2xy + yw^2$, subject to $2x + y + w^2 = 24$ and $x + w = 8$.
4. If, instead of $g(x, y) = c$, the constraint is written in the form of $G(x, y) = 0$, how should the Lagrangian function and the first-order condition be modified as a consequence?