Macroeconomics / Makroekonomie 318

Tutorial 3 / Tutorial 3

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Question 1 / Vraag 1

A firms profit function is given by,

$$\Pi = 24x - x^2 - xy - 2y^2 + 33y - 43$$

In this example, x and y represent the quantities of good x and y sold.

a.) Find the values of x and y that optimise this profit function.

b.) Conduct the following steps to determine if we have a local maximum.

1. Calculate the partial derivatives with respect to x and y of the profit function.
2. Calculate f_{xx}
3. Calculate $d = f_{xx}f_{yy} - f_{xy}^2$

Note: If $f_{xx} < 0$ and $d > 0$, then we have a local *maximum*.

Question 2 / Vraag 2

In the following question we want to calculate the quantities of good x and y that are consumed subject to a specific budget. The goal of the consumer is to maximise utility. Determine the maximum utility level given that the utility function is given by,

$$U = xy$$

The budget constraint is given by $x + 3y = 12$.

a.) Construct a Lagrangian for this problem.

b.) Calculate the first order conditions with respect to x, y and the Lagrangian multiplier.

c.) Solve the system of linear equations to find the values of x and y that maximise utility.

Question 3 / Vraag 3

Work through the consumer problem with an **inequality constraint** as posed in the lecture notes.