

ECON 4113. OPTIONAL HOMEWORK PART 2. DUE MAY 2.

Solve the following problems by all means necessary. If you use Lagrange Theorem do the Constraint Qualification properly. There is no need to check second order conditions. Hint: graph the functions, this helps a lot.

1. For each value of the parameter $q \in [-1, 1]$ solve the following problem

$$\begin{aligned} \max_{p \in \mathbb{R}} \quad & qp^2 - p \\ \text{s.t.} \quad & 0 \leq p \leq 1 \end{aligned}$$

- 2.

$$\begin{aligned} \max_{x, y \in \mathbb{R}} \quad & -x^2 - 2y^2 - xy - 2x \\ \text{s.t.} \quad & x^2 + y^2 \leq 4 \\ & x + y \leq 2 \\ & x, y \geq -2 \end{aligned}$$

- 3.

$$\begin{aligned} \max_{x, y \in \mathbb{R}} \quad & e^{-(x+y)} \sin x \\ \text{s.t.} \quad & y = |x| \end{aligned}$$

4. Dixit, Problem 3.2

- 5.

$$\begin{aligned} \max_{x, y \in \mathbb{R}} \quad & x \\ \text{s.t.} \quad & x^3 + y^2 = 0 \end{aligned}$$