Math Review Part II
Problem Set 4

Divya Bhagia*

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1. Solve the following constrained maximization problem:

$$\max \quad f(x,y,z) = yz + xz \qquad \text{s.t.} \qquad y^2 + z^2 = 1 \qquad \text{and} \qquad xz = 3.$$

2. Solve the following constrained maximization problem:

$$\max \quad f(x_1,x_2) = x_1^2 x_2 \qquad \text{s.t.} \qquad (x_1,x_2) \in C_h \qquad \text{where} \qquad C_h = \{(x_1,x_2) : 2x_1^2 + x_2^2 = 3\}$$

   Use the second order conditions to determine which of the critical points are local maxima and which are local minima.

3. Minimize

$$\begin{aligned} &(x-a)^2 + (y-b)^2 \\ \text{s.t} \quad & x \leq 1 \\ & y \leq 2 \end{aligned}$$

   for all possible real values of a and b.

4. Maximize

$$\begin{aligned} &ln(x+1) + ln(y+1) \\ \text{s.t} \quad & x + 2y \leq c \\ & x + y \leq 2 \end{aligned}$$

   where c is a positive constant.

   4.1. Write down the Lagrangian and the necessary Kuhn-Tucker conditions.

   4.2. Solve for $c = 5/2$.

   4.3. Let $V(c)$ denote the value function. Find the value of $V'(5/2)$

*PhD Candidate in Economics at Boston College (email: bhagia@bc.edu)