Econ 377
Semester 1, 2007

University of Otago
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Assignment 1

due: Thursday, March 8, in class

Problem 1: Show whether the following functions are convex or concave:

a) $f(x_1, x_2) = (0.5x_1^2 + 0.5x_2^2)^{1/2}$

b) $f(x_1, x_2) = 2x_1^{1/2}x_2^{1/2}$

c) $f(x, y, z) = x^{1/2}y^{1/2}z^{1/2}$

Problem 2: Consider a CES (constant elasticity of substitution) utilty function of the form $U(x_1, x_2) = (x_1^\rho + x_2^\rho)^{1/\rho}$ and suppose the consumer is on her budget constraint, where income is denoted by I and prices by p_1 and p_2.

a) Write down the constrained utility maximization problem.

b) Solve it to find the demand functions $x_i(p, I)$.

c) Check the second order conditions.

Problem 3: Consider the objective function $f(x, y) = x^2 + 2y$ and the following inequality constraints: $x^2 + y^2 \leq 5$ and $y \geq 0$.

a) Write down the Lagrangean function and the first-order-conditions.

b) What are the complementary slackness conditions?

c) Find pairs (x, y) that satisfy all the necessary conditions.