University of Wisconsin-Madison Department of Economics

Econ 703 Prof. R. Deneckere Fall 2002

Homework #11

- 1. Sundaram, #3, p. 198.
- 2. Let $C \subset \mathbb{R}^n$ be a convex set. Show that $X = \{ x \in \mathbb{R}^p : x = A\rho, \rho \in C \}$, where A is a given p x n real matrix, is a convex set in \mathbb{R}^p .
- 3. Show that the real-valued function

$$f(x) = \sum_{j=1}^{n} x_{j} \ln x_{j} - \sum_{j=1}^{n} x_{j} \ln(\sum_{k=1}^{n} x_{k})$$

is convex on the set $C(\alpha) = \{ x \in \mathbb{R}^n : x > 0, x_1 + \dots + x_n = \alpha \}$, where $\alpha > 0$.

- 4. Sundaram, #7, p. 199.
- 5. Show that a real-valued, positively homogeneous function on \mathbb{R}^n is convex if and only if the inequality

$$f(x + y) \le f(x) + f(y)$$

holds for every pair of x and y in \mathbb{R}^n