ECONOMICS 6201 (FALL 2009)
MIDTERM EXAMINATION
75 POINTS TOTAL

QUESTION 1 (20 POINTS)

True or false and explain:
(a) (5 points) The Engel curve derived from a linearly homogeneous utility function is a line.
(b) (5 points) The profit function is homogeneous of degree 0 in prices.
(c) (5 points) The change in cost-minimizing labor input induced by an infinitesimal change in the rental rate equals the change in the cost-minimizing capital input induced by an infinitesimal change in the wage rate.
(d) (5 points) The Cobb-Douglas utility function $U(x_1, x_2) = x_1^\alpha x_2^{1-\alpha}$ where $\alpha \in (0, 1)$ is quasiconcave.

QUESTION 2 (10 POINTS)

Suppose a firm’s production function is given by $f(x_1, x_2) = \min\{2x_1 + x_2, x_1 + 2x_2\}$.

(a) (4 points) Sketch the associated isoquant map.
(b) (6 points) Find the firm’s conditional factor demand functions $x_1(w, y)$ and $x_2(w, y)$.

QUESTION 3 (13 POINTS)

State Shephard’s Lemma and prove it from scratch (i.e. you are not allowed to just refer to the envelope theorem).

QUESTION 4 (10 POINTS)

Suzy Q has preferences over bundles of rock and roll ($r$) and gin ($g$), given by the binary preference relation $\succeq$ on $X \equiv \mathbb{R}_+^2$. Suzy loves both rock and roll and gin, but isn’t too particular about the exact combinations; her preference ordering is such that when comparing any two possible bundles of rock and roll and gin (each of which she considers “good stuff”), she strictly prefers the bundle with more total stuff. But if a pair of bundles has exactly the same TOTAL quantity of $r$ and $g$, she strictly prefers the bundle with more gin. If the total amount and the amount of gin are the same, she is indifferent between the bundles.

(a) (6 points) Formally define the preference ordering $\succeq$ from the description of Suzy’s preferences given above. [i.e. “($r^A, g^A$) $\succeq$ ($r^B, g^B$) (bundle $A$ is weakly preferred to bundle $B$) if and only if ...”]

(b) (4 points) Are Suzy’s preferences complete? convex? strictly monotonic? continuous? (You do NOT need to prove your answers; a brief explanation for each is sufficient.)

Good Luck!
QUESTION 5 (10 POINTS)

You have been hired by the firm Dewy, Cheatem and Howe (DCH) to assess whether their client, Mayor Rogers, is acting in the community-owned firm’s best interest (providing a fixed level of services $y$ at minimal cost in the neighborhood). Under Mr. Rogers’ management, the firm produces $y$ using two inputs, $x_1$ and $x_2$, which have input prices $w_1$ and $w_2$, respectively. Ten months ago, DCH observed Mr. Rogers using 8 units of $x_1$ and 4 units of $x_2$ to produce $y^0$ units of output when input prices were $(w^0_1, w^0_2) = (6, 6)$. This past month, Mr. Rogers produced $y$ units of output under the new input prices $(w^1_1, w^1_2) = (1, 6)$.

(a) (5 points) Define the set of input pairs $(x^1_1, x^1_2)$ that do not violate cost minimization in period 0. Sketch this set in a graph.

(b) (5 points) Suppose the observed input choices in period 1 are $(x^1_1, x^1_2) = (10, 2)$. Does this indicate a violation of cost minimization in period 0? What about period 1? Briefly explain.

QUESTION 6 (12 POINTS)

(a) (5 points) Write down the formula and verbal interpretation of the money metric indirect utility function $\mu(p, q, m)$.

(b) (7 points) Prove that $\mu(p, q, m)$ is concave in prices $p$. 