KANSAS STATE UNIVERSITY
ECONOMIC ANALYSIS FOR BUSINESS

Midterm Examination — Spring 2012
Economics 815 — Professor D. Weisman

I. Short Answer (40 points). Answer 4 (and only 4) of the following 6 questions.

1 Market demand function is given by Q = 20 – 2P. A price change occurs that simultaneously raises revenue and increases consumers' surplus. What is the direction of the price change? What can you tell me about price in this market prior to the change? What can you infer about the price elasticity of demand before the price change?

2. A firm's production function is given by $Q = 4K^{0.5}L^{0.5}$, where K is capital and L is labor. Suppose that w = 2 and r = 2. How much K and L would the firm optimally employ to produce 64 units of output? What is the total cost of producing this level of output?

3. Demand is given by $Q^D = 20 – P$. Supply is given by $Q^S = 10$. What price ceiling does the government set in this market if consumers are better off by $50 under the price ceiling relative to the free-market outcome?

4. The airlines have estimated that the average price of an airline ticket would rise by $40 if the government mandated child safety seats on airplanes. The government believes this policy would reduce fatalities on airplanes by 400 per year. The demand function for automobile travel is $Q^M = 200 - P^G + I + 0.75P^A$, were Q^M is quantity of miles driven per year (in units of 100,000 miles), P^G is the price per gallon of gasoline, I is per-capita income (in thousands of dollars) and P^A is the average price of an airline ticket (in dollars). The government estimates that there are 10 automobile fatalities for each 100,000 miles driven. Determine whether mandating child safety seats on airplanes will save lives? Provide the economic rationale for your answer.

5. Quantity demanded is given by Q = 40 – 2P. What is the price that prevails in this market if consumer surplus is equal to 64? What is the price elasticity of demand at this price?

6. Suppose that the production function for your grade on this examination is given by $G = 35 + E^{1/2}A^{1/2}$, where *A* is ability (fixed at 100), *E* is effort (measured in terms of hours of study) and *G* is your numerical score. Student rankings in the MBA program determine future employment and salaries. Suppose that your (discounted) earnings increase by $10 for each additional unit of *G*. In addition, suppose that you currently have outside employment that pays you a wage of $10/hour and you are able to work as many hours as you like. What level of *E* would you choose if your objective is to maximize earnings? What would happen to *G* if your wage were to increase? Why?

II. Problems (60 points). Answer 2 (and only 2) of the following 3 questions.

1. Analysis of Supply and Demand.

a) The price elasticity of demand is equal to –2 when P = 6 and Q = 12. Find the equation of the linear demand curve: $Q^D = a - bP$, where a and b are constants?

b) Suppose that the supply function is given by $Q^S = 2P + \frac{1}{2}T$, where T is an index of technological progress in the industry. Use the demand function you derived in part a) to find the equilibrium price and quantity. Derive an expression that indicates how price varies with technological progress when the market is in equilibrium. Provide an economic interpretation of your findings.

c) What value of T generates the maximum level of revenue in this market? What is this maximum level of revenue? What is the price elasticity of demand at the corresponding price and quantity?

2. The FDA (Food and Drug Administration) has recently given consideration to placing price controls on drug companies to prevent price gouging. Suppose that the demand function for prescription drugs is given by $Q^D = 60 - 4P + 2e$ and the supply function for prescription drugs is given by $Q^S = 1P$, where P is price, Q is quantity and e is an index of drug effectiveness. The FDA is giving consideration to imposing a ceiling price on prescription drugs of $P^{max} = 16$.

a) Let $e = 20$ both before and after the imposition of the ceiling price. Are consumers of prescription drugs better off under this policy? Provide a careful economic analysis in support of your claim.

b) Suppose that $e = 10$ following the FDA's imposition of the price ceiling. Determine the value(s) of P^{max} that must prevail if consumers are worse-off relative to the free-market (no government intervention) outcome you derived in part a). Provide a careful economic analysis in support of your claim.

c) What effect, if any, would the imposition of a price ceiling have on the incentives for drug companies to consolidate (merge)?

3. A firm's production function is given by $Q = K \cdot L \cdot R$, where K is capital, L is labor and R is raw materials with input prices of r, w and z, respectively. The firm employs $K^* = 2$, $L^* = 4$ and $R^* = 4$ to produce its output efficiently and incurs total costs of \$24.

a) Determine the input prices r, w and z faced by the firm?

b) Determine whether this production function is characterized by DRS, CRS or IRS? Construct a representative LRAC curve for this firm.

c) Determine the $MRTS_{L\text{-}R}$ at the optimal input values given in the statement of the problem.