Due in Serhan’s box before 4 p.m. on Thursday, June 3rd.

1. Many telephone companies charge all residential customers a monthly flat rate for local service, for which they can make as many calls as they wish. (Thus the price of an additional call is zero, even though the marginal cost may be positive.) An Iowa phone company (CowBell) has two residential customers. The monthly demand function for Mr. 1 is given by $Q_1 = 100 - p$, where $p$ is the price of a call in cents. Mr. 2’s demand function is $Q_2 = 50 - p$. Each call costs CowBell 10 cents. (For simplicity, assume that there are no fixed costs.)

(a) What flat rate must CowBell charge in order to break even?

(b) What is the dead weight loss associated with this situation?

(c) Determine whether or not one consumer is being cross-subsidized by the other.

(d) Design a (Pareto-improving) declining block tariff which (i) makes Mr. 2 better off; (ii) leaves Mr. 1 no worse off; and (iii) continues to allow CowBell to break even. How much will such a tariff reduce dead weight loss in the market? (HINT: The Pareto-improving tariff includes a fixed charge lower than the initial flat rate.)

2. An electric power company serves a group of households who demand electricity only during the day. Their inverse demand curve is given by $P_1=70-y_1$. The power company also serves a large industrial customer that demands electricity only during the night. (During the day it powers its plant using solar energy.) This factory’s demand for electricity is totally inelastic at 50 units. It costs the power company 20 per unit of capacity it installs, plus fuel coats of 5 for each unit of electricity it produces.

First, solve the power company’s peak-load pricing problem. That is,

a. Find the optimal day time price.

b. Find the optimal night time price. (Assume that the power company exactly breaks even.)

c. Determine how much capacity the power company should install.

d. As a result of residential growth, the daytime demand curve shifts out to $P_1=100 - y_1$, while the nighttime demand remains unchanged. Recalculate your answers to a, b, and c.