Econ 100B (Grossman)—Winter 2010
Answers (but not detailed solutions) to Spring 09 final exam free-response questions

1. Externality question

   (a) $F_m = F_k = 4$, $T = 8$

   (b) $U_m = 12$, $U_k = -4$, $U = U_m + U_k = 8$

   (c) $F_m = F_k = 4$, $T = 4$; $U_m = 8$, $U_k = 2$, $U = 10$

   (d) Optimal tax is \$1 per hour

   (e) $U_m = 4 + 2 = 6$, $U_k = 4 + 2 - 2 = 4$, $U = 10$

   (f) $p_T = 1$

   (g) $U_m = 4$, $U_k = 8 - 2 = 6$, $U = 10$

   (h) $p_T = 1$

   (i) $T = 4$ $U_m = 8 + 4 = 12$, $U_k = 0 - 2 = -2$, $U = 10$

   (j) Right-to-noise. The optimal tax rate or price that perfectly internalizes the externality happens to be equal to the price of fruit. Because Myra views fruit and music as perfect substitutes, she is indifferent between all combinations of fruit and music (that cost \$4). Under the tax or right-to-quiet, Myra chooses T and how much to pay, and, given her indifference, we cannot really predict what she'll choose. However, under right-to-noise, Kathleen chooses how much quiet to buy and she strictly prefers $T = 4$.

2. Oligopoly question

   The answers to parts a through g you can get simply by looking at the chart summarizing the results of the extended oligopoly models comparison example from the second set of lecture slides on oligopoly (from 2/11). The inverse demand given is $p = 2 - Q$ *and* $MC = 1$ *so* $a = 2$ *and* $c = 1$*, implying* $a - c = 1$*. Thus the answers are mostly just the coefficients from the relevant column in the chart*

   (a) Cournot: $Q = 2/3$, $p = 4/3$

   (b) Cournot: $CS = 2/9$, $\Pi = 2/9$, $W = 4/9$

   (c) Cartel: $Q = 1/2$, $p = 3/2$

   (d) Cartel: $CS = 1/8$, $\Pi = 1/4$, $W = 3/8$

   (e) Competition: $p = MC = 1$, $Q = 1$, $CS = 1/2$, $\Pi = 0$, $W = 1/2$

   (f) From competition to cartel: output decreases, price increases, profits up, CS and welfare down

   (g) Subsidy effectively reduces MC to zero. $p = 2/3$, $Q = 4/3$. Profits and CS increase, but benefits are canceled out by cost of subsidy (govt. expenditures). Subsidy causes Q to overshoot efficient quantity of 1, it lands as far above efficient Q as it was below before. The result is symmetric and equal DWL.

   (h) On the other hand, the subsidy is exactly enough to land the monopolist to land at the efficient level of provision. $Q = 1$, $p = 1$. As with competition, $CS = 1/2$. The monopolists' profits are zero per unit, but it gets the subsidy of 1 per unit, making for profits of 1. However, the subsidy costs 1 to provide, so $W = 1/2 + 1 - 1 = 1/2$. Because the subsidy encourages the under-producing cartel to produce the efficient amount, the DWL disappears.

   (i) See previous two answers. Subsidy would lower welfare in competitive case. Competitive industry already produces efficient amount. Subsidy would lead to inefficient over-production.

   (j) See above answers