7 Externality and Public Goods

Practice Question 15 (Market Structure and Externality)**.** Suppose that the inverse demand curve for paper is

$$p = 200 - Q$$

the private marginal cost (unregulated competitive market supply) is

$$MC_p = 80 + Q$$

and the marginal harm from gunk is

$$MC_g = Q$$

(a) What is the unregulated competitive equilibrium?

(b) What is the social optimum? What specific tax (per unit of output or gunk) results in the social optimum?

(c) What is the unregulated monopoly equilibrium?

(d) How would you optimally regulate the monopoly? What is the resulting equilibrium?

Practice Question 16 (Private Provision of Public Goods)**.** Anna and Bess are assigned to write a joint paper within a 24-hour period about the Pareto optimal provision of public goods. Let t_A denote the number of hours that Anna contributes to the project and t_B the number of hours that Bess contributes. The numeric grade that Anna and Bess earn is a function,

$$23\ln(t_A + t_B)$$

of the total number of hours that they contribute to the project. If Anna contributes t_A, then she has $(24 - t_A)$ hours in the day for leisure. Anna's utility function is

$$U_A = 23ln(t_A + t_B) + ln(24 - t_A)$$

and Bess's utility function is

$$U_B = 23ln(t_A + t_B) + ln(24 - t_B)$$

(a) If they choose the hours to contribute simultaneously and independently, what is the Nash equilibrium number of hours that each will provide?

(b) What is the number of hours each should contribute to the project that maximizes the sum of their utilities?

Practice Question 17 (Public Goods)**.** Consider good x with two consumers. Consumer 1's MWTP is given by $MWTP_1 = 1 - Q_1$, while consumer 2's MWTP is $MWTP_2 = 2 - Q_2$.

1. Assume that x is not a public good, compute the social demand for this economy.
2. Assume that x is a public good.
   (a) Explain two characteristics of good x.
   (b) Compute the aggregate MWTP for this economy.
   (c) Suppose the marginal social cost is given by $MSC = 5Q$. Compute the social efficient output level Q^*.
   (d) Is the market, without government intervention, going to produce Q^*, given that x is a public good? Explain why or why not?