

EconS 301- Intermediate Microeconomic Theory
Homework #2 - Due date: Tuesday December 6th, 2022.

1. Black Smoke eatery is the only restaurant in small town. They face inverse demand $p = 25 - 0.05q$ and have costs $TC(q) = 3 + 4q$. Unfortunately, the eatery produces a lot of unsightly black smoke at the same rate as output (so, pollution is equal to q).
 - (a) Find the unregulated equilibrium.
 - (b) Assume that the external cost of Black Smoke's pollution is $EC = 2q$. Find the social optimum.
 - (c) If the regulator is to seek the socially optimal output, what pollution quota would she set?
 - (d) If the regulator is to seek the socially optimal output, what emission fee would she set?

2. Can the following situations be effectively addressed under the Coase theorem? Discuss why or why not.
 - (a) Air pollution
 - (b) A homeowner playing loud music (negatively affecting his neighbors) within a homeowners' association (HOA)
 - (c) Light pollution in a town with a powerful telescope (that needs surrounding darkness to be effective)
 - (d) Use of an irrigation ditch between two ranches

3. Two neighbors in a rural community were fed up with the town's landfill policies and decided to purchase land together to use as their own landfill. However, the two neighbors did not anticipate the consequences of their purchase and quickly found their new landfill to smell. Each neighbor has 10 bags of trash. Dumping on their own land is cheap, but they have to endure an increased bad smell, however dumping at the town's landfill incurs a cost of \$3 per bag. Neighbor 1 lives downwind of the new landfill and endures the brunt of the smell. Her utility is

$$u_1(b_1, b_2) = -3(10 - b_1) - (b_1 + b_2)^2 - (b_1 + b_2)$$

while the upwind neighbor's utility is

$$u_2(b_1, b_2) = -3(10 - b_2) - (b_1 + b_2)^2$$

where b_i is the number of bags each neighbor dumps at their own landfill. Note that the utilities are negative as both actions are actually

- (a) How much will each neighbor dump at their new landfill?
- (b) If the neighbors were to coordinate, how much would they dump at their new landfill?