This problem set is due in Istvan’s box by 4 p.m. on Tuesday, June 1st.

Two firms share a small fishing ground. The price (and marginal consumer benefit) of fish is $1. The catch of fish is constant at 240, as long as at least one boat goes out fishing. However, each firm’s share of the catch is the same as the proportion of the boats it sends out. That is, \( F_1 = \frac{240B_1}{(B_1+B_2)} \) and \( F_2 = \frac{240B_2}{(B_1+B_2)} \). It costs $20 for firm 1 to send out each boat. Firm 2 is less efficient, and incurs a cost of $30 to send out each of its boats. Each firm must choose whether to send out 0, 1, 2, or 3 boats. Assume that, initially, no one has property rights over the fishing ground.

1. Construct the (4 by 4) payoff matrix for these two firms.
2. Assume that the firms independently decide upon how many boats to send out. What will be the Nash equilibrium number of boats sent out by each firm? What will be the equilibrium profits of each firm.
3. What would the efficient outcome be for this market? Explain your answer.

Now suppose that one of the firms “owns” the fishing ground. That is, the other firm must obtain permission before it can send out any boats.

4. Given that the firms can bargain, how many boats of each firm will go out? Does it matter which firm has property rights over the fishing ground? Is this what the Coase Theorem would predict? Explain.

Next, suppose that the Supreme Court has decreed that the fishing grounds are an “essential facility” and that access must be granted to them at “reasonable rates.” For example, even if one firm “owns” the fishing grounds, the other firm has the right to send out its boats if it is willing to pay the owner a set fee for each boat sent out.

5. If firm 2 owns the fishing grounds, what is the highest fee that firm 1 would pay for the right to send out a boat? Explain. (HINT: Remember, firm 1 is not buying the property rights, merely the ability to compete for fish with firm 2.)
6. Can this system of “access rights” ever achieve the efficient outcome? Explain why or why not?

Finally, suppose the state government “owns” the fishing grounds and has establishes a fee that must be paid by any boat sent out.

7. What is the lowest price the state should charge? Is it possible to achieve the efficient outcome for the fishing ground if the state charges this price? Explain.