

Problem Set 2: Property Law

Assigned: Sep. 19
Answers: Sep. 29
Midterm: Oct. 3

Part A. Expected Values

Question A1. Suppose that there are five possible outcomes in an uncertain future for your firm. The profits associated with the outcomes are, respectively, 100; 123; 849; 900; and 1,254. The probabilities of the outcomes are, respectively, 0.11, 0.25, 0.33, 0.09, 0.22. What is your firm's expected profit?

Question A2. Suppose the profits associated with the outcomes are instead 902; 1,345; 14,987; 100,564; and 1,000,000 with the same probabilities as in A1. What is your firm's expected profit?

Question A3. Two dice are rolled. What is the expected number of dots showing?

Part B. Uniform Distribution

Question B1. In class, we discussed the special case of the uniform distribution on the interval $[0, 1]$. In general, the uniform distribution on an interval $[a, b]$ has density function $f(x) = 1/(b - a)$ and distribution function $F(x) = (x - a)/b$. Was our discussion of the special case consistent with this general form?

Question B2. Given the general formulae in B1, what would the distribution function $F(x)$ be for a random variable that was distributed uniformly between 0 and 1/2?

Part C. Nash Bargaining

Question C1. Apply the Nash bargaining algorithm to the boxed example ("A Civil Dispute As a Bargaining Game") in Cooter and Ulen on page 78.

Part D. Bargaining under Uncertainty

Question D1. Solve the problem from class in which supplier S makes a take-it-or-leave-it offer of a price p to buyer B . Recall, B 's valuation for a unit of the good, v is private information, uniformly distributed on the interval $[0, 1]$. The difference here is that you should not normalize S 's cost of production, c , to zero. That is, solve the problem assume that c takes on a positive value. Continue to assume that c is not random.

Part E. Relief for Harm

A factory produces smoke that causes damage of \$80 to the laundry of a local resident. The smoke damage can be eliminated in one of two ways: the factory can install a chimney at cost \$90 or the resident can purchase an electric dryer, and use this to dry his laundry, at cost \$60. Consider the following two legal rules:

- (a) The factory has an unlimited right to pollute.
- (b) If the factory pollutes, it must pay the resident's damages.

Question E1. Suppose first that it is prohibitively expensive for the factory owner and the resident to negotiate. What will the outcomes be under the two legal rules?

Question E2. Suppose instead that the factory owner and resident can bargain costlessly. In particular, the outcome from bargaining is given by the Nash bargaining solution. What will the outcomes be under the two legal rules?

Part F. Open Access vs. Private Ownership

There are N fishers in a community. They have a choice of fishing in the ocean or a lake. Fish caught in either location are perfect substitutes. The ocean is so large that each fisher can catch w fish no matter how many fishers go to sea. The lake may become congested. Specifically, if there are x fishers on the lake, each of them catches $x^{-1/2}$ fish (i.e., $x^{1/2}$ fish are caught in total and each fisher catches the same number). Each fisher is free to choose whether to go to the ocean or the lake and no one will go where he expects to catch fewer fish.

Question F1. How many fishers will go to the lake, how many to the ocean, and what will be the total catch?

Question F2 If the government restricts access to the lake, how many fishers should it allow on the lake to maximize the total catch in the community? How can the government use licenses to come up with a fair way to control access, i.e., a way in which all fishers are equally well off (hint: think about the price and quantity of licenses the government should offer).

Question F3 Assume the demand for fish is $Q = A - BP$. Compare the price of fish in the free access and restricted access regimes.