PROBLEM SET 10

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Questions marked (**T,F,U**) should be answered "True," "False," or "Uncertain," and your answer should be briefly justified. Note that points will be awarded based only on your reasoning, not on the answer itself, even if correct.

(1) (**T,F,U**) The short-run supply curve of a price-taking firm is exactly the firm's short-run marginal cost curve.

(2) (**T,F,U**) A fifteenth century Italian widow wrote to her son for advice on buying an adjoining piece of property because:

> ... if someone else buys it and should decide to build a wall, it would cut off all the light from our ground floor kitchen, and all the land behind. This house would be worth nothing if the courtyard lost its sunlight....

Had she read Coase, she wouldn't have to waste a postage stamp — she would have known that she should buy the property.

(3) (**T,F,U**) Consider the competitive equilibrium for an exchange economy. If the endowment of each person increases by 10% for each good, everyone is better off at the new competitive equilibrium since everyone consumes more of each good.

(4) (**T,F,U**) Suppose that at an initial cost of \$1000, a homeowner can insulate his house and same \$50 each year in heating bills. If the interest rates are 6%, should the houseowner insulate or not?

(5) Profits in a competitive industry will never fall below the interest rate, since otherwise it would be more efficient to liquidate the firm and invest the proceeds.

(6) A global warming conference held in Kyoto some years ago issued a plan which recommended that the U.S. reduce its annual emissions of "global warming gases" to 7% less than the 1990 level of U.S. emissions. One way to reduce emissions is to invest in technology such as scrubbers; another is to retire technologies and processes which produce such gases. Either of these alternatives is costly; one early estimate suggests that the costs

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of implementing this plan (for the U.S. alone) will amount to about $2000 per U.S. household from the years 2008 through 2012 (inclusive).

a) If the previously mentioned estimates are correct, and if interest rates are constant at 2.5%, then what is the present value of the cost to each U.S. household? [Assume, both here and below, that all valuation occurs on the first day of each year; you may assume "present value" to mean value as of January 1, 2002]

b) Experts are unsure of the consequences of a failure to reduce emissions, but it seems likely that these would include the loss of many valuable assets such as real estate located near sea-level, and the costly relocation of both households and businesses in response to dramatic changes in climate. Suppose that the costs of catastrophic global warming, if it were to occur, amount to $5000 per U.S. household from the year 2018 on. What is the present value of preventing this catastrophe, if interest rates are as given above?

c) Now suppose that if we reduce emissions, then the probability of catastrophic global warming is 0, while if we fail to reduce emissions, the probability is p. What is the smallest value of p which would justify the costly reduction of emissions described above?