Natural Resource Economics
Summer 1998

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Qualifying Exam

Answer all of the following three questions.

1. Compare the derivations of the Hotelling Rule for a competitive industry and for a monopolist.

2. Under certain special assumptions, a competitive, open access fishery's dynamics can be described by the system

$$\begin{aligned} \dot{h}_t &= \frac{j[\,\phi(h_t) - c(x_t)] - c'(x_t)[F(x_t) - h_t]}{c(x_t)}\, h_t \\ \dot{x}_t &= F(x_t) - h_t \end{aligned} \tag{1}$$

   where j is a positive constant, ϕ is the inverse demand curve, h_t is harvest, c is marginal cost, x_t is stock size, and F is the excess of natural deaths over natural births.

   Assume that $c'(x_t) \equiv 0$ and that $\phi(h) = 10 - h$. Then draw the phase diagram implied by (1) for "low cost," "high cost," and "medium cost" situations.

3. What did our study of copper processing teach about entropy in economics?