Homework #3

Danny Edgel
Econ 711: Microeconomics I
Fall 2020

November 12, 2020

Question 1

y can't figure out the intuition here

(a) This game is supermodular if each payoff function, $u_i(w_i, w_{-i})$ had increasing differences for all i. Since there are only two agents with symmetric and twice-differentiable payoff functions, this is true if

$$\frac{\partial^2 u_i}{\partial w_i \partial w_j}(w_i, w_j) \geq 0$$

So, to determine whether this game is supermodular,

$$\begin{aligned} u_i(w_i, w_j) &= \gamma w_i - \beta(w_i - w_j)^2 - \left(\rho + \frac{\alpha}{2}(w_i + w_j)\right) w_i \\ &= (\gamma - \rho)w_i - \frac{\alpha}{2}w_i^2 + 2\left(\beta + \frac{\alpha}{2}\right) w_i w_j - \beta w_j^2 \\ \frac{partial u_i}{\partial w_i}(w_i, w_j) &= \gamma - \rho - (\alpha + 2\beta)w_i + (\alpha + 2\beta)w_j \\ \frac{\partial^2 u_i}{\partial w_i \partial w_j}(w_i, w_j) &= \alpha + 2\beta \end{aligned}$$

Where, by assumption, $\alpha, \beta > 0$, so this is a supermodular game.

(b)

(c)

(d)

(e)

(f)

Question 2

Question 3

(a)

(b)

(c)

Question 4

Question 5