Day 4: Homework

Homework 1: Go to `http://oyc.yale.edu/sites/default/files/problemset2_1.pdf` and do exercises 3 and 4. The homework set mentions "pure strategy" a few times, just ignore the phrase because we haven't covered that yet.

Homework 2: Redo activity 5 in the class worksheet, except with the numbers slightly changed. I have marked the changed numbers in **bold**:
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You and a friend are working on a group project. The payoff you collectively get from the project is

$$\mathbf{4}A + \mathbf{4}B + AB,$$

where A is the hours of effort you put in and B is the amount of hours your friend puts in. However, we are going to subtract A^2 from the payoff to represent how the effort of working hard makes you unhappy. So your individual payoff from the project is going to be half the collective payoff, minus A^2, in other words, for you and your opponent respectively the payoffs are

$$\frac{\mathbf{4}A + \mathbf{4}B + AB}{2} - A^2 \text{ and } \frac{\mathbf{4}A + \mathbf{4}B + AB}{2} - B^2.$$

You are each able to put in between 0 and **4** hours of work into the project.

(a) If you know that your friend is going to put in B hours of work, what is the value of A that will maximize your payoff? Remember that a function $Q(A)$ that depends on A has maxima and minima at the points where the derivative $Q'(A) = 0$. (How can you tell it is a maximum and not a minimum?)

(b) If your friend knows you are going to put in A hours of work, what is the value of B that will maximize your friend's payoff?

(c) Draw a graph, where the x-axis is B, and the y-axis is A. Draw a curve that tells you what your best response A is to your opponent's choice of B.

(d) Draw another curve on that same graph that represents your opponent's best response B to your choices of A.

(e) Using the best response principle, eliminate all your choices A that are not a best response to one of your opponent's choices of B and write down what choices for A you have left. You should get a range (m, n) of choices, where $m > 0$ and $n < \mathbf{4}$. Do the same for your friend- eliminate all choices of B that are not the best response to an A between 0 and **4**.

(f) Re-draw the graph using that smaller set of choices for A and B. What are the best responses for both players?

(g) What happens when you keep repeating this process?