1. A 4x2 Game

In the following game: (a) Find all the equilibria; (b) Compute player 1's expected payoff in equilibrium; (c) If player 1 is willing to buy your advice, what can you tell her?

	x	y
a	12, 0	0, 6
b	11, 1	1, 5
c	10, 2	4, 2
d	9, 3	6, 0

2. A partnership game (infinite action space)

Two partners $i = 1, 2$ share a firm and have to decide how much effort to put into it. Each chooses effort level $x_i \geq 0$ at cost x_i^2; the firm's profit is $\pi = 4(x_1 + x_2 + cx_1x_2)$ where $0 < c < 1$. Profit is shared, so $u_i(x_1, x_2) = \pi/2 - x_i^2$. Compute Nash equilibrium. *Hint.* This is a pair (x_1^*, x_2^*) where both payoffs are maximized, use calculus to find best response of i as a function of $x_j, j \neq i$, call it $b_i(x_j)$ and solve the resulting system $x_i = b_i(x_j), i \neq j = 1, 2$.

3. Crime and police (again infinite action space)

The two players are the police P and a criminal C. The police choose enforcement level $x \geq 0$ and the criminal chooses crime intensity $y \geq 0$. Police payoff is $u_P(x, y) = -(c^4 x + y^2/x)$, so that c^4 is enforcement unit cost (assume $c > 0$, the power you will see is there to simplify reading of the solution) and the level of enforcement mitigates the negative y^2 effect of crime intensity. The criminal payoff is $u_C(x, y) = \sqrt{y}/(1 + xy)$, where we may interpret $1 + xy$ as the probability of escaping and $\sqrt{y}$ as the utility of crime, with decreasing marginal utility. Compute Nash equilibrium (the procedure is the same as in the previous exercise) and make sure the dependence of equilibrium on c makes sense.