PRINT your Name: Solution

Consider the payoff matrix below:

	A	B	C	D
A	(3, 7)	(-1, 7)	(-3, 6)	(4, 6)
B	(-2, 10)	(6, 8)	(7, 10)	(3, -1)
C	(-1, 7)	(5, 8)	(5, 7)	(5, 10)
D	(5, 4)	(6, 9)	(4, 3)	(5, 3)

1. Compute the reduced payoff matrix. You can just use the matrix above and just cross out the dominated rows and columns.

   Solution: In order to reduce the payoff matrix, we repeatedly look for rows and columns which are dominated by other rows (or columns).

   Notice that for the row corresponding to strategy A, the first number in each column (the payoff for the row player) is less than the corresponding number for strategy D. That is, $3 < 5$, $-1 < 6$, $-3 < 4$, and $4 < 5$. Under no circumstances would a thinking player use strategy A when D could be used instead. So, we remove that strategy. This doesn't happen for the other two strategies (yet), so we reduce the payoff matrix to

	A	B	C	D
B	(-2, 10)	(6, 8)	(7, 10)	(3, -1)
C	(-1, 7)	(5, 8)	(5, 7)	(5, 10)
D	(5, 4)	(6, 9)	(4, 3)	(5, 3)

   Now we look for dominated strategies for the column player, which means we compare the second numbers in given columns. Here, we see that strategy C is never better than strategy A, (since $10 \geq 10$, $7 \geq 7$, and $4 > 3$) so we can conclude that the column player would never prefer C when A could be used instead. Thus, we arrive at

	A	B	D
B	(-2, 10)	(6, 8)	(3, -1)
C	(-1, 7)	(5, 8)	(5, 10)
D	(5, 4)	(6, 9)	(5, 3)

   Since we have crossed out a column, it is possible that now there is another dominated row, and in fact, both B and C are dominated by D (since $-2 < 5$, $6 \leq 6$, and $3 < 5$; similarly, $-1 < 5$, $5 < 6$, and $5 \leq 5$). This leaves us with the matrix

	A	B	D
D	(5, 4)	(6, 9)	(5, 3)

and we turn to the column player's strategies again. The column player naturally wants the best payoff, and now knows that the row player will always play D. Since 9 is the biggest number, the column player will only play strategy B. Hence, the completely reduced payoff matrix is

	B
D	(6, 9)

2. What are the equilibrium points, if any?

   Solution: Since there is only one entry in the reduced payoff matrix, it is the only equilibrium point. That is, strategy (D, B) is the equilibrium point, with a payoff of 6 for the row player, and 9 for the column player.