Prisoners Dilemma:

\[
\begin{array}{c|cc}
   & P_1 & P_2 \\
\hline
C & -3 & -3 \\
D & 0 & -4 \\
\end{array}
\]

Best Responses

Best Response \((BR)\)

\[
BR_i (a_{-i})
\]

given fixed action of all other players.
\[ BR_1(C) = C \]
\[ BR_1(D) = C \]

\[ BR_2(C) = C \quad \text{Best Response Dynamic} \]

Player 1

→

Player 2

Denies
Nash Equilibrium

(NE)

Intersection of best Responses.

NE — each player is playing his best response to the actions of all the other players.
NE has interesting implications:

NE is a "SELF ENFORCING" Agreement
Nash equilibrium is also a self enforcing agreement.
Nash equilibrium - outcome from which no player has an incentive to deviate unilaterally.

Nash Equilibrium is a 'No-Regret' outcome.
\[ \begin{array}{c|cc}
  & C & D \\
\hline
P_1 & -3, -3 & 0, -4 \\
P_2 & -4, 0 & -1, -1 \\
\end{array} \]

\textit{No-Regret'}

\textbf{Nash Equilibrium}:

For each player \( i \), if \( a_i^*, a_{-i}^* \) is a Nash equilibrium, then

\[ u_i(a_i^*, a_{-i}^*) \geq u_i(a_i, a_{-i}^*) \]

\( a_i^* \) to \( a_i^* \) for each player \( i \).
- has to hold for each player $i$
- each action $i$