separately. The payoffs (benefits) are as follows.

Girl \ Boy	B	S
B	5, 6	1, 1
S	2, 2	6, 5

Here both attending the same game, whether it is softball or baseball, are both stable solutions.

This Battle of the Sexes is an example of coordination games arise naturally in many contexts such as the context of routing to avoid congestion (see the book)

Example ③: not all games has stable outcomes in the sense that none of players would want to individually deviate from such an outcome.

Matching Pennies Game: Two players, each having a penny, are asked to choose from among two strategies - heads (H) and tails (T). The row player (player 1) wins if the two pennies match while the column player (player 2) wins if they do not match.

1 \ 2	H	T
H	1, -1	-1, 1
T	-1, 1	1, -1

1 : win
-1 : loss

It is easy to see that this game has no stable solution and the best for the players to randomize (with prob $\frac{1}{2}$) between strategies (Randomized (mixed) strategies)

All examples ①, ②, and ③ are one-shot simultaneous move games, in that all players simultaneously chose an action from their set of possible strategies.

☆ Formally, we have n player $\{1, 2, \ldots, n\}$. Each player i has his own set of possible strategies, say S_i. To play the game, each player i selects a strategy $s_i \in S_i$. We will use $s = (s_1, \ldots, s_n)$ to denote the vector of strategies selected by the players and $S = \times_i S_i$ denote the set of all strategies, each has a payoff for each player, i.e. $u_i(s)$ where $s \in S$ is a vector.

☆ We say a game has a <u>dominant strategy solution</u> if each player has a unique best strategy, independent of the strategies played by the other players. <u>More formally</u> for a strategy vector $s \in S$ we use s_i to denote the strategy played by player i and s_{-i} to denote the $(n-1)$-dimensional vector of the strategies played by all other player

— We say a strategy vector $s \in S$ is a <u>dominant strategy solution</u> if for each player i, and each alternate strategy vector $s' \in S$, we have that $u_i(s_i, s'_{-i}) \geq u_i(s'_i, s'_{-i})$. For example, Prisoners' Dilemma has a solution that always confess, but note that a dominant strategy solution may not give an optimal payoff to any of the players.