Game Theory - Assignment 3

Due date: **October 10, 2023**.

1. In the game in Table 1, $a, b, c, d \in (-\frac{1}{4}, \frac{1}{4})$. Show that there is a **unique** correlated equilibrium of this game. Find this correlated equilibrium. What is the limit of this correlated equilibrium as a, b, c, d approach 0?

	X	Y
A	$(1, 0)$	$(c, 1+d)$
B	$(0, 1)$	$(1+a, b)$

Table 1: Correlated equilibria

2. Consider a two-player Bayesian game where a parameter $\theta \in \{0, 3\}$ is observed by Player 1. Player 2 believes that it is equally likely that $\theta = 0$ and $\theta = 3$. For every value of θ, the strategic-form game associated with Table 2 is played.

	a	b
A	$(2, 2)$	$(0, \theta)$
B	$(\theta, 0)$	$(1, 1)$

Table 2: A Bayesian game

   (a) What are the strategies of the players in this Bayesian game.

   (b) Compute two Bayesian equilibria of this game.

3. Consider a two-player Bayesian game shown in Table 3. Here, ϵ_1 is observed by Player 1 and ϵ_2 is observed by Player 2. Both ϵ_1 and ϵ_2 are distributed uniformly between $[-\frac{1}{3}, \frac{2}{3}]$ and this is common knowledge.

	a	b
A	$(2+\epsilon_1, 2)$	(ϵ_1, ϵ_2)
B	$(0, 0)$	$(1, 2+\epsilon_2)$

Table 3: A Bayesian game

   (a) What are the strategies of the players in this Bayesian game.

(b) Compute a Bayesian equilibrium in which each Player plays each of its actions for *some* type of hers (i.e., *do not* consider a Bayesian equilibrium where for every type a player plays the same action).