

Exercise 1

What is/are the equilibrium/s in pure strategies in this game? Find all of them. Is this game dominance-solvable? If it was, what would the dominant strategy equilibrium be?

		Player 2	
		X	Y
Player 1	A	0, 0	0, 1
	B	2, 0	0, 0

Exercise 2

Two gas-distribution companies decide on entering a new market. Company A is a well-established firm. Company B is a newcomer. Both companies decide independently, however, they are aware of each other's intentions. If both enter, they will face each other. Expected gross revenue for A is \$75 million, for B \$65 million, however, both would also spend \$35 m. as investment and advertising costs. If A enters the market and B does not, A will have to invest \$30 m., however, it will subsequently earn \$110 m. B will lose \$20 m. in costs. If neither of them enter, A saves \$30 m. and B \$20 m. in investment costs. If only B enters the market, it will spend \$20 m. on investment, but will cash \$70 m. in returns, while A would save itself \$30 m. If we presume rationality of both actors, how would both companies decide and why?

		B	
		Enter	Stay out
A	Enter		
	Stay out		

Exercise 3

Two companies are developing a new drilling technology. Given the circumstances, the question of compatibility of both technologies is important. Drill&Co is developing technology DC7, company NorthStar is developing incompatible technology NSx. Both companies agree, that if they both adopt the same technology, they would cash \$20 B from the developing industry. If they adopt different technologies, compatibility issues would jeopardize both companies and each would end up with \$0. Accommodating technology of the competitor would cost Drill&Co \$10 B. If NorthStar was to adopt the competitor's technology, it would need to spend \$25 B. Which technology is going to be used, if both companies were aware of the costs and decision was made simultaneously?

		NorthStar	
		DC7	NSx
Drill&Co	DC7		
	NSx		

Exercise 4

Imagine a situation, where natural gas producer P is deciding, whether to ship natural gas via pipelines of the transit country T. Transit country T decides, whether to siphon (steal) natural gas from transit pipelines, or not. It is important to note that producer has no other transit option. P decides between shipping 90 bcm of gas, each bcm worth \$400. T is capable of stealing 10 bcm. If T steals 10 bcm, P will lose the revenue of the stolen amount and will earn revenue of the rest, while T earns the value of stolen gas. If P decides not to ship gas, it will lose all the revenues from the whole shipment of 90 bcm. If T decides not to steal or no amount is shipped, it will earn 0. What is/are the equilibrium/s of this game? How could we interpret it?

		P	
		Ship	Stop
T	Steal		
	Not-steal		

Exercise 5

How would the previous game change if there was an alternative route of transport that would circumvent the transit country? What is/are the equilibrium/s of this modified game?

		P	
		Ship	Stop
T	Steal		
	Not-steal		

Bonus question

How many equilibriums in pure strategies can you find in Rock-Paper-Scissors game?
Justify the result.

		Player 2		
		Rock	Paper	Scissors
Player 1	Rock	0 , 0	-1 , 1	1 , -1
	Paper	1 , -1	0 , 0	-1 , 1
	Scissors	-1 , 1	1 , -1	0 , 0

Hints:

1. Row player's payoffs are always written first, column player's payoffs are second
2. When searching for dominant strategy equilibrium, compare payoffs of the player between her strategies - for row player, compare all her payoffs in each column; for column player, compare all her payoffs in each row
3. When searching for NE, compare, what is the player's A best reply to player's B particular strategy - always ask: if player B played a strategy s , which strategy of player A is the best reply to B's strategy s (yields highest payoff)? Again, compare payoffs in each column for row player; compare payoffs in each row for column player