

Due: Wednesday, August 7 (in class)

Question 1: Solve for the Nash Equilibrium for the following 2-by-2 game.

		White Sox	
		Confess	Deny
Cubs	Confess	-3, -3	0, -6
	Deny	-6, 0	-1, -1

Question 2: There is a **STOP** (State Law: Yield to Pedestrians) sign in the middle of the street between Gerdin business school and the parking lot at Iowa State. When school is in session, many students cross that street to attend classes either in Gerdin or East/Heady hall. The problem is that there are always some arrogant drivers who instead of coming to a full stop yielding to students crossing the street required by Iowa state law, like to speed up when approaching to the stop sign in order to scare away pedestrians. We can model this real world situation using game theory. Suppose there are two players, a driver and a pedestrian. Driver has two strategies to choose: yield to pedestrian (Yield) or accelerate to run over that pedestrian (Accelerate). The pedestrian has two strategies too: stop to let the car pass by though she has the right of way (Stop) or stand up for your right keeping crossing the street ignoring the incoming car (Cross). Solve for Nash Equilibrium of the following 2-by-2 game based on the pay-off table.

		Driver	
		Accelerate	Yield
Pedestrian	Cross	-50, -50	20, -10
	Stop	-10, 20	0, 0

Question 3: Solve for the Nash Equilibrium for the following 4-by-4 game:

			Paul		
		Montreal	NYC	Toronto	Boston
	Montreal	2, 3	0, 0	5, 1	1, 2
John	NYC	-1, 6	2, 3	10, 4	8, 4
	Toronto	0, 0	3, 1	8, 3	2, 1
	Boston	1, 9	-1, 9	3, 9	0, 9

Question 4: [Cournot Model] Assume for simplicity that a monopolist has no costs of production and faces a demand curve of given by $Q = 150 - P$.

1. Calculate the profit-maximizing price-quantity combination for this monopolist. Also calculate the monopolist's profits.
2. Suppose a second firm enters the market. Let q_1 be the output if the first firm and q_2 be the output if the second. Market demand is now given $Q = q_1 + q_2 = 150 - P$. Assume that this second firm also has no costs of production, use the Cournot model of duopoly to determine the profit-maximizing level of production for each firm as well as the market price. Also calculate each firm's profits.

Question 5: [Bertrand Model] Suppose firms A and B operate under conditions of constant average and marginal costs, but that $MC_A = 10$, $MC_B = 8$. The market demand for the firms' output is given by $Q = 500 - 20P$.

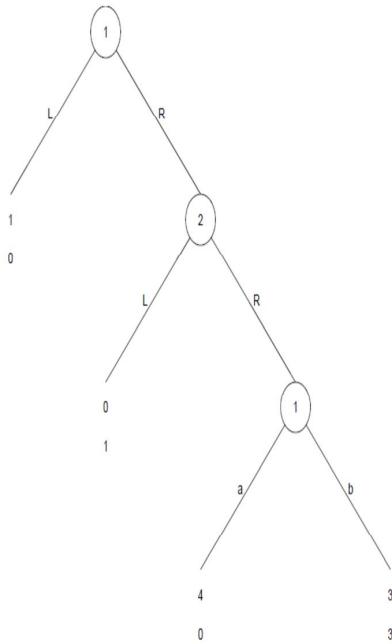


Figure 1: Question 7

1. If the firms practice Bertrand competition, what will be the market price under a Nash equilibrium?
2. What will be the profits for each firm?

Question 6: [Stackelberg Model] There are two competing firms selling a homogeneous good and we know the average cost and marginal cost of producing each unit of the good for these two firms: $AC_1 = MC_1 = 10$ and $AC_2 = MC_2 = 10$. Firm 1 moves first and decides on the quantity to sell: q_1 ; firm 2 moves next and after seeing q_1 , decides on the quantity to sell: q_2 . $Q = q_1 + q_2$ is the total market demand. Both firms seek to maximize profits and the market demand is: $Q = 130 - P$.

1. Calculate the quantity produced by each firm.
2. What will be the profits for each firm?

Question 7: Find the SPE (sub-game perfect equilibrium) for the extensive-form game in Figure 1.

Question 8: Based on the friendship network shown in Figure 2:

1. Calculate the clustering coefficient of this network.

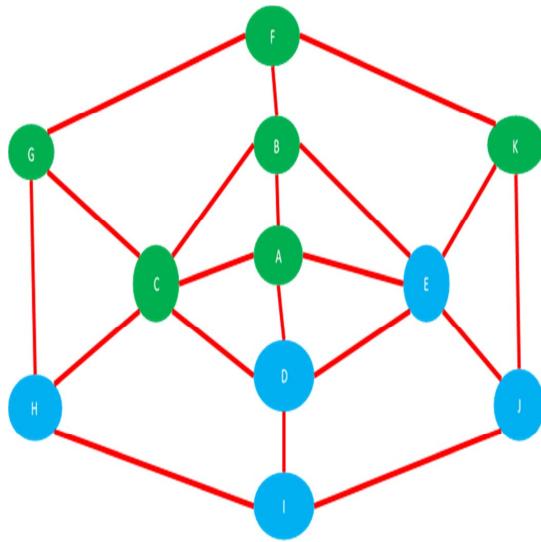


Figure 2: Question 8

2. We know that A, B, C, F, G and K are econ major students while D, E, H, I and J are math major students. Calculate the Homophily Index for A, E, F and K.
3. Among these four guys, A, E, F and K, how many of them exhibit inbreeding homophily? Who are they?