Spring 2008 – Chesnes
120 Minutes – 500 Points

Economics 414 – Final

Please answer ALL questions on this examination. Be sure to explain any non-standard notation that you use and JUSTIFY your answers. Each question's weight is shown in parentheses. Good Luck!

1. **(35%)** ***Infinitely Repeated Cournot.*** **Consider a duopoly with market (inverse) demand of $P(Q) = 30 - Q$ where each of the two firms has a constant marginal cost of production equal to 6. There are no fixed costs.**

   Suppose initially that the game is played only once.

   a. **Show that a monopolist facing the same demand and having the same costs would choose a quantity of $Q^m = 12$ and earn monopoly profits of $\pi^m = 144$.**

   b. **Suppose the two firms play a simultaneous Cournot game. Show each firm has a best response function equal to:**
   $$q_i(q_j) = 12 - \tfrac{1}{2} q_j$$
   and in equilibrium, each firm produces $q^c_i = 8$ units and earns a profit of $\pi^c_i = 64$.

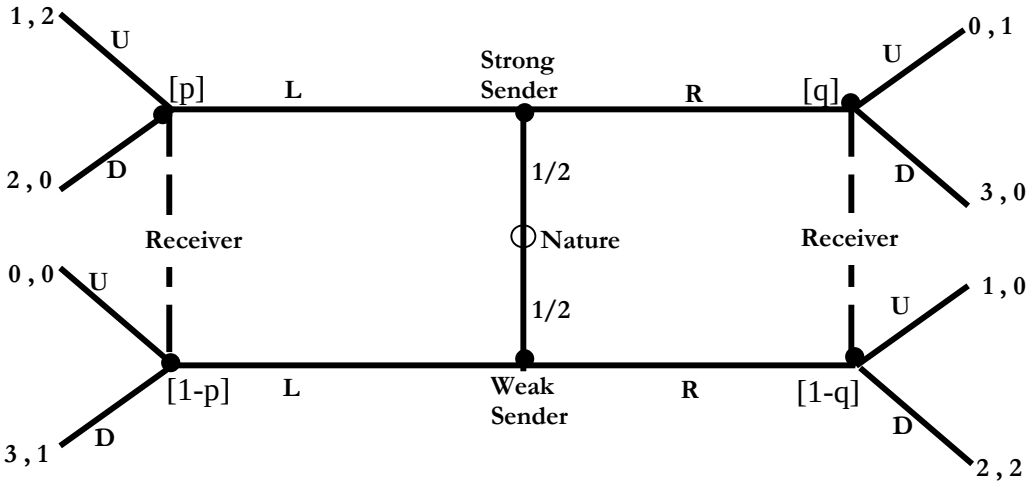
   Now suppose that the firms interact repeatedly. Consider the following grim trigger strategy for each firm:
   - ✓ **Choose $\frac{1}{2} Q^m$ in the first period.**
   - ✓ **Choose $\frac{1}{2} Q^m$ in each subsequent period if no firm has deviated in any prior period.**
   - ✓ **Choose the static Cournot Nash Equilibrium strategy in each subsequent period otherwise.**

   c. **Show the optimal one-period deviation by a firm is to choose a quantity of $q^d_i = 9$ and earn a one-period payoff of 81.**

   d. **Find the critical discount factor, δ^*, required to sustain cooperation (i.e. joint monopoly) in all periods.**

   e. **Suggest an alternative strategy in the infinitely repeated game that may sustain cooperation. You do not need to calculate the new critical discount factor, but state if it would be higher or lower compared to your solution in part (d).**

2. ***(25%) Signaling Game.*** **Payoffs are denoted (X,Y) for the sender and receiver respectively.**



a. **State the 4 conditions required for a Perfect Bayesian Equilibrium.**

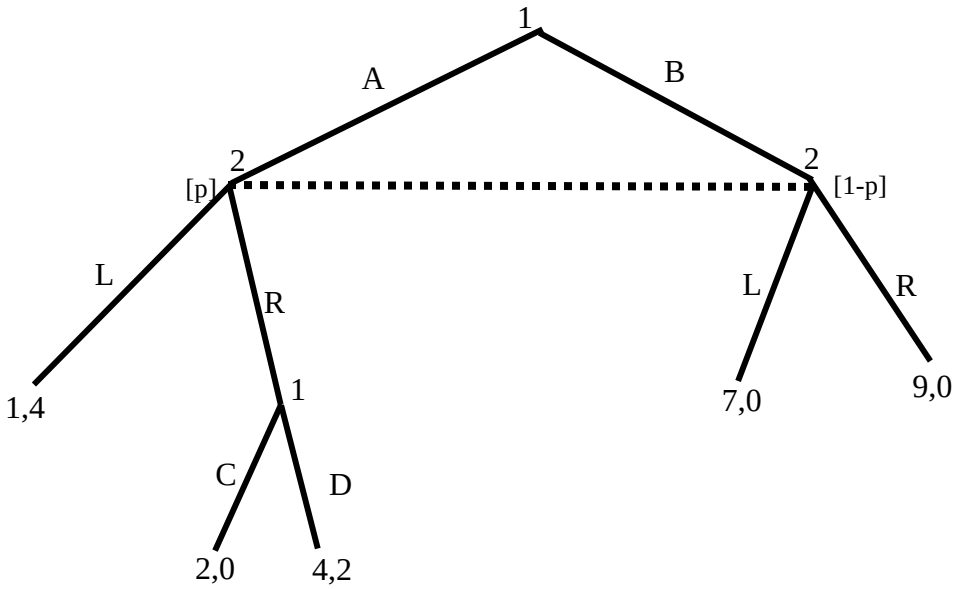
In the game above:

b. **How many subgames are there?**

c. **How many information sets do each of the players have?**

d. **Solve for all (pure strategy) PBE's.**

3. **(20%)** ***Dynamic Game of Incomplete Information.*** **Payoffs are denoted (X,Y) for players 1 and 2 respectively.**



a. **What are the strategies of each player?**

b. **Write down the game in strategic (normal) form and solve for the pure strategy Nash Equilibria.**

c. **Which Nash Equilibria (if any) that you found in part (b) are subgame perfect?**

d. **Given beliefs, (p, 1-p) as shown in the game tree, solve for the Perfect Bayesian Equilibria of the game.**

4. (20%) *Simultaneous Move Game.*

Player 2

Player 1		**L**	**C**	**R**
	T	**(-10, -10)**	**(10, -15)**	**(15, 0)**
	M	**(-10, 10)**	**(-5, 0)**	**(-10, 10)**
	B	**(0, 10)**	**(0, 0)**	**(0, 0)**

a. What strategies survive Iterated Elimination of Strictly Dominated Strategies?

b. Find all Nash equilibria of the game (Pure and/or Mixed).