Instructions:
You must answer exactly 4 of the following 5 questions. Each question is worth the same amount. You have the class period to complete the exam.
Answer each question clearly and concisely. You must show your work to receive credit.
This exam is given under the rules of the Montana State University. You may not use notes or receive any assistance. There is to be no talking during the exam.
Clearly print your name above and in the space provided on the next page. You must turn in both sides of this cover sheet along with your responses. You do not need to turn in the questions, only your responses with the cover sheet.
1. Given an inverse demand function of $P = 120 - 2Q$ and costs for Firm $i$ of $C(q_i) = 18q_i$, find the Cournot duopoly equilibrium:
   
   (a) Firm Quantity
   (b) Price
   (c) Consumer Surplus
   (d) Deadweight Loss

2. Consider the following strategic form game in Figure 1. The payoffs are listed as the (payoff to the player on the left, payoff to the player on top).
   
   (a) For $A \geq 0$ derive the best response functions conditional on the possible values of $A$.
   
   (b) What are the mixed strategy Nash equilibria of the game conditional on the possible values of $A$?
   
   (c) What are the expected payoffs when $A = 2$?
   
   (d) What are the expected payoffs when $A = 8$?
3. There are two firms in an industry: Firm A and Firm B. Firm A’s market share is 30%.
You’ve estimated Firm A and B’s residual demand to be

\[ P_A = 100 - q_A \]
\[ P_B = 80 - 2q_B \]

and Firm A reported their costs as

\[ C(q_A) = 5 + 20q_A + \frac{q_A^2}{4} \]

but Firm B failed to report their costs. You also observe that right now, \( q_A = 32 \) and \( P_B = 20 \).

(a) What is the HerfindahlHirschman Index?
(b) What is the firm equivalent measure and what interpretation do you get from this measure?
(c) What is the Lerner Index for each firm?
(d) What is the industry average Lerner Index?

4. The market demand curve is

\[ P = 115 - 3Q, \]

there are two firms and each firm has a constant marginal cost of 7. Competition between the two firms takes place over two periods. The first period is as usual. In the second period, consumers incur a switching cost of $1 if they switch firms. Assume that both consumers and firms are myopic.

(a) Describe the equilibrium in the first period if firms compete in prices.
(b) If firms compete in prices, how does the equilibrium change in the second period?
(c) If firms compete in quantities, are the quantities strategic substitutes or strategic complements in the second period?
(d) Describe the equilibrium in the second period if firms compete in quantities.
(e) Do switching costs have a bigger impact on price competition or quantity competition and why?
5. Someone is going to pay you a lot of money to develop an economic model that describes the behavior in a particular market. For each question below, the number of firms is always given and cannot change. You don’t need to develop an actual model, just describe the features you would add and how your modifications would change the equilibrium outcomes.

(a) You start with a simple monopoly model, but feel the equilibrium outcome is not competitive enough. Besides adding more firms, how could you make the outcome of this model more competitive? How would the equilibrium change?

(b) You start with a standard perfectly competitive model, but feel the equilibrium outcome is too competitive. Besides changing the number of firms, how could you make the outcome of this model less competitive? How would the equilibrium change?

(c) You start with the basic Cournot model. Besides changing the number of firms, how could you make the outcome of this model more competitive? Besides changing the number of firms, how could you make the outcome of this model less competitive? For each modification, how would the equilibrium change?

(d) Let’s say that you end up with four different models that you think describe the behavior of a particular market reasonably well. How would you choose between the different models?