Name: ____________________________________________

Instructions:
You must answer all of the following 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. By printing your name above you acknowledge the University’s Honor Code and agree to comply with the provisions of the Honor Code. You may not use notes or receive any assistance. There is to be no talking during the exam. You may use a calculator, but are never allowed to use device allowing you to take photographs or transmit over a network. No notes, no assistance, no talking, no cell phones, but you can use a calculator.

Clearly print your name above, in the space provided on the next page and in your blue book(s). You must turn in your blue book(s).
1. The inverse demand function is \( P = 147 - 4Q \) and costs for Firm \( i \) are \( C(q_i) = 7q_i \). Assume that firms compete in prices and that there are two firms.

   (a) What is each firm’s best response function?

   (b) What is the market equilibrium price and quantity?

   (c) If each firm’s capacity constraint is 40, how is the market equilibrium price and quantity affected?

   (d) Now if each firm’s capacity constraint is 10 and there is free entry and exit, how is the market equilibrium price and quantity affected?

2. Measures of market performance

   (a) How do you calculate the industry average Lerner index, what does it measure, and what do the values imply (e.g. small values imply X, large values imply Y)?

   (b) How do you calculate the HHI, what does it measure, and what do the values imply?

   (c) An industry has 5 firms, the HHI is 0.8125 and the Lerner index is close to zero.

      i. How would you describe this industry?

      ii. Should the government regulate it?

      iii. How does your answer apply to the efficiency critique?
3. 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 $A = 8$?

4. Market demand is $p = 50 - Q$. There are $N$ firms that compete in quantities. Each firm has a cost of $C(q) = cq_i$ where $c > 0$.

(a) What is the best response function for a firm?

(b) Find the equilibrium quantity of a firm, market quantity and price. (These will all be functions of $N$ and $c$.)

(c) Show that an increase in $c$ causes the price to increase and the market quantity to decrease.

(d) For an increase in $c$ if the change in the price larger or smaller than the change in the market quantity?

(e) Determine deadweight loss as a function of $c$ and $N$ and is deadweight loss increasing or decreasing as $c$ increases?