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.
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1. Almost all members of government agree that the deficit must be reduced, but there doesn’t seem to be any agreement on how to reduce the deficit.

(a) Describe a simplistic political deficit reduction game. Your description should explicitly list all the elements of your game.

(b) How do your assumptions match up with reality? How are they abstractions from reality?

(c) What is the equilibrium outcome of your game and how does this outcome match up with reality?

(d) Now suppose the government creates the Joint Select Committee on Deficit Reduction whose job is to create a proposal to reduce the deficit. Their proposal cannot be amended by congress and is only subject to a yes or no vote. If the proposal is not approved, the budget is slashed in such a way that makes everyone unhappy. How does the creation of this committee change your deficit reduction game? What elements of the game have changed?

2. The inverse market demand is \( P = 60 - \frac{1}{4}Q \). There are two firms, A and B. Firm B produces \( q_B = 40 \).

(a) What is Firm A’s residual inverse demand curve?

(b) What is the Firm A’s marginal revenue expressed as a function of their quantity?

(c) What is the Firm A’s price elasticity of residual demand if Firm A produces \( q_A = 80 \)?

(d) Assuming that Firm A maximizes profits, how can you determine the Lerner Index and what is the Lerner Index for the firm if Firm A produces \( q_A = 80 \)?

3. The inverse market demand function is \( P = 100 - Q \). Assume that all firms have the following cost structure.

\[ C(q_i) = 300 + 28q_i + 3q_i^2 \]

For simplicity, assume that the number of firms must be an integer (it’s not possible to have 2.1 firms).

(a) If there is only one firm, what is that firm’s profits in equilibrium?

(b) Characterize the perfectly competitive equilibrium price, quantity, and number of firms. Be sure to explain and justify your rational for finding the perfectly competitive equilibrium.

(c) In the context of your answers above, what is the dead weight loss created by a monopolist?
4. The inverse demand function is \( P = 50 - \frac{1}{9}Q \) and there are two firms who compete in quantities. The costs for each firm are as follows

\[
C(q_1) = 4q_1 \\
C(q_2) = c_2q_2
\]

where \( c_2 \) is a positive constant.

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

(b) What are the equilibrium quantities for each firm?

(c) What is the Herfindahl index (HHI) for this industry?

(d) What do you think the sign of \( \frac{dHHI}{dc_2} \) is and why?

(e) How does your answer to the part d depend on the value of \( c_2 \)?

5. The inverse demand function is \( P = 125 - 4Q \). There are two firms which compete in prices and have constant marginal costs of 29. Each firm has a production capacity of \( x \). If both firms charge the same price, assume they both split the market evenly.

(a) Assuming Firm B produces at their capacity, \( q_b = x \), find Firm A’s residual demand and marginal revenue.

(b) If the capacity constraint for each firm, \( x \) is such that \( x \leq 8 \), what are the equilibrium prices and quantities. (Be sure to justify and show your work.)

(c) If the capacity constraint for each firm, \( x \) is such that \( x \geq 24 \), what are the equilibrium prices and quantities. (Be sure to justify and show your work.)

(d) If the capacity constraint for each firm, \( x \) is such that \( 8 < x < 24 \), what are the equilibrium prices and quantities. (Be sure to justify and show your work.)