Problem Set 2 [45 pts[1]]
ECON 326 – Spring 2021
Due Wed. March 24th at 9:30am
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Instructions: Complete this assignment to the best of your abilities. Your grade on this assignment is based upon correctness, reasoning, and showing your work. In some questions, there is more than one correct answer. Even if your answer is not correct, a well-reasoned (and well-written) explanation of your answer *may* still be awarded full credit.

Group Work: You may work with a partner on this and turn in one assignment with both names on it. If I do not have both names on the turned in assignment, I will assume the person who turned it in completed it alone.

1. [5 pts] A local landscaping company faces demand of $P(q) = 100 - 10q$. Total costs are $C = 140 + 10q + 5q^2$. Find the firm's profit-maximizing output, price, and profit. Should it shut-down in the short run? What if demand changes to $P(q) = 100 - q$? Should it shut down now?

2. [5 pts] Suppose a firm in a perfectly competitive industry faces total costs
$$TC(q) = 200 + 20q - 5q^2 + 10q^3$$
Find the firm's shut-down price. [*Hint: find the firm's minimum of average variable cost. You can do this one of two ways: the first is to find AVC and MC and set them equal to each other (remember that the average cost curves intersect the marginal cost curve at their lowest point), or you can set the derivative of the AVC curve equal to zero and solve for q. In either of these cases, you will plug this value back into your AVC curve to find the shut-down price.*]

3. [5 pts] Find a real world example of each type of the following markets:
    a. Perfect Competition
    b. Monopoly
    c. Stackelberg
    d. Bertrand
    e. Contested Market
    f. Monopolistic Competition

4. [5 pts] You are the manager of a firm that produces output in two plants. The demand for your firm's product is $P = 100 - 5Q$, where $Q = Q_1 + Q_2$. The costs associated with producing in the two plants are $C = 3(Q_1)^2 + 2(Q_2)^2$. How much output should be produced in each plant in order to maximize profits? What is the equilibrium price?

5. [5 pts] The inverse market demand in a homogeneous-product Cournot duopoly is $P = 150 - 5(Q_1 + Q_2)$ and costs are $C_1(Q_1) = 15\,Q_1$ and $C_2(Q_2) = 25Q_2$
    a. Determine the equilibrium output for each firm.
    b. What is the equilibrium market price?
    c. What are each firm's profits?
    d. If firms competed via Bertrand, how would the equilibrium market outcome change?

[1] Each problem set is worth the same weight, but the points may differ to make grading easier.

6. [5 pts] Consider the following pricing game between Bernie's Lemon Fizz and Adam's Orange Zip. Bernie can set a high, medium, or low price for the drink while Adam is only considering a High or Low price, and their profits are given by the following table:

		Adam's Orange Zip: High Price	Adam's Orange Zip: Low Price
Bernie's Lemon Fizz	High Price	35, 20	40, 15
	Medium Price	20, 20	25, 20
	Low Price	50, 20	-10, 10

   a. What is the Nash Equilibrium of the above game when both firms choose price simultaneously?
   b. Draw a game tree (extensive form game) when Bernie commits to a price first. What is the outcome when Bernie chooses his price first?
   c. Draw a game tree (extensive form game) when Adam commits to a price first. What is the outcome when Adam chooses his price first?
   d. Compare the different outcomes. Is there an advantage to moving first in this game?

7. [5 pts]In a one-shot game, if you advertise and your rival advertises, you will each earn $5 million in profits. If neither of you advertises, your rival will make $4 million and you will make $2 million. If you advertise and your rival does not, you will make $10 million and your rival will make $3 million. If your rival advertises and you do not, you will make $1 million and your rival will make $3 million.
   a. Write the above game in normal form.
   b. Do you have a dominant strategy?
   c. Does your rival have a dominant strategy?
   d. What is the Nash equilibrium for the one-shot game?
   e. How much would you be willing to bribe your rival not to advertise?

8. [5 pts] The NCAA prohibits schools that are caught paying athletes from participating in bowl games, and sometimes the punishment is even more severe. Explain why schools do not break away from the NCAA and form a league in which athletes can legitimately be paid. [*Hint: Use hypothetical payoffs to construct an illustrative normal-form game in which the strategies are "pay players" and "don't pay players." Then analyze the game in one-shot and infinitely repeated contexts. Alternatively, you could describe the situation in words using concepts from game theory.]*

9. [5 pts **HARD**] We discussed how the Bertrand and Cournot models of duopoly lead to wildly different equilibrium results. What is the primary reason these models are so different (what assumption drives this result)? What can we change about the Bertrand model so that its results match that of the Cournot model? [*Hint: Google is your friend. Just make sure to cite your sources and don't copy-paste answers. That's plagiarism.*]