KEY

ECO 610 Final Exam
December 2019

Name:
4-digit:

100 points total. Point values for each question are as indicated. Answer each question in the space provided. General advice: show your work, including any formulas or diagrams that you use in reasoning through your answers.

1. (10 pts.) The top ten U.S. Airlines ranked by total number of passengers carried in 2017 were Southwest (162.5 million passengers), Delta (145.9 m), American (145.7 m), United (107.6 m), JetBlue (40.1 m), SkyWest (35.9 m), Alaska (26.7 m), Spirit (24.2 m), Frontier (17.0 m), and Republic (17.0 m). For purposes of answering this question we will ignore the smaller airlines. Suppose that JetBlue and Spirit decide to merge, with the new airline's business strategy centered on operating super fuel-efficient jets that are painted green. How would such a merger change the industry HHI? Show your calculations, including the formula you use. 10

$HHI = \sum_{i=1}^{n} s_i^2$

0 -> Atomistic

10,000 -> Monopoly

SW $(162.5 \div 722.6)^2 = 0.0505$
Delta $(145.9 \div 722.6)^2 = 0.04407$
AA $(145.7 \div 722.6)^2 = 0.0406$
UA $(107.6 \div 722.6)^2 = 0.0221$
JB $(40.1 \div 722.6)^2 = 0.00308$
Sky $(35.9 \div 722.6)^2 = 0.00246$
Alaska $(26.7 \div 722.6)^2 = 0.001365$
Spirit $(24.2 \div 722.6)^2 = 0.001122$
Frontier $(17.0 \div 722.6)^2 = 0.00055$
Rep $(17.0 \div 722.6)^2 = 0.00055$

722.6

0.16331

0.16331 × 10,000 = 1633.1

HHI - Pre merger

SW $(162.5 \div 722.6)^2 = 0.0505$
Delta $(145.9 \div 722.6)^2 = 0.04407$
AA $(145.7 \div 722.6)^2 = 0.0406$
U $(107.6 \div 722.6)^2 = 0.0221$
JB+SP $(64.3 \div 722.6)^2 = 0.0079$
Sky $(35.9 \div 722.6)^2 = 0.00246$
Alaska $(26.7 \div 722.6)^2 = 0.001365$
Front $(17.0 \div 722.6)^2 = 0.00055$
Rep $(17.0 \div 722.6)^2 = 0.00055$

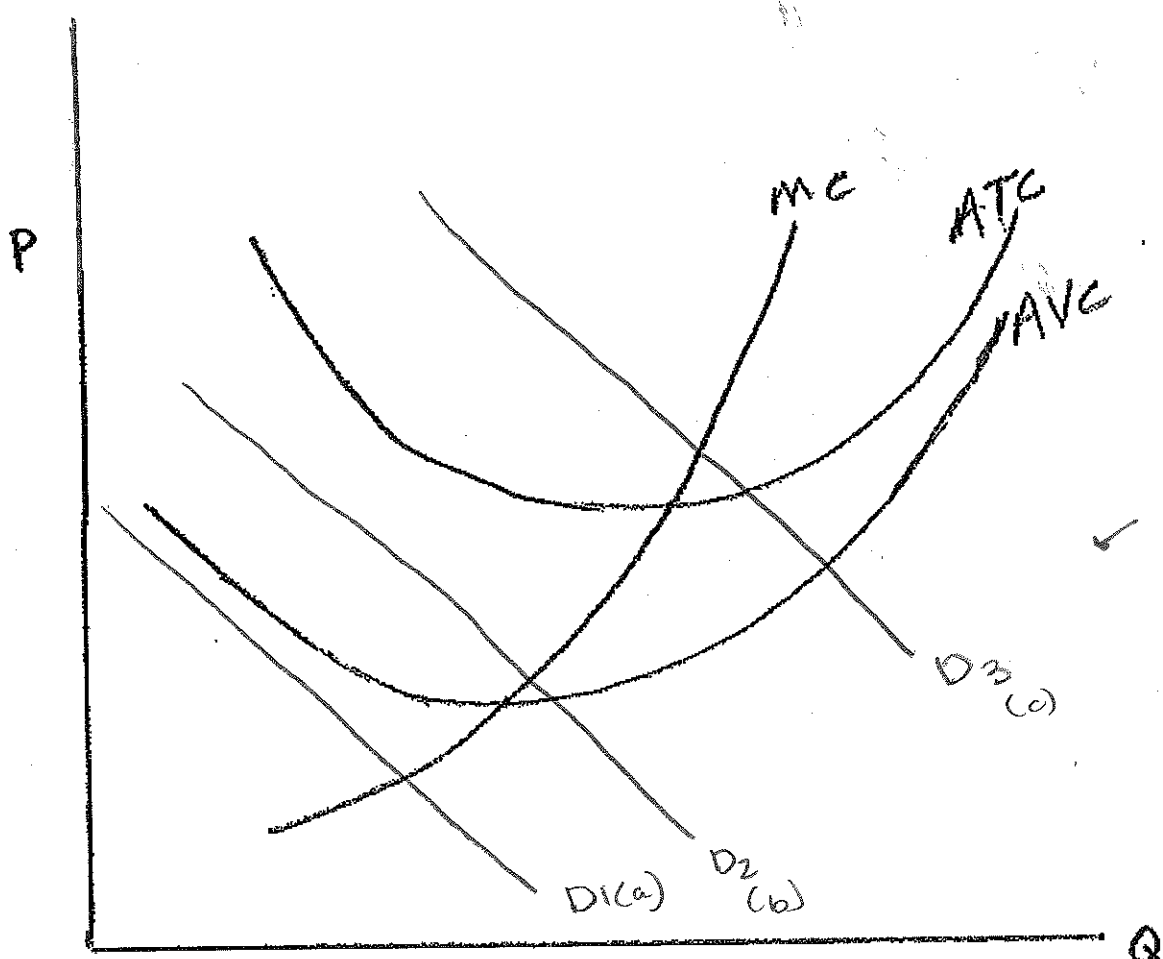
722.6

0.1670

0.1670 × 10,000 → 1670.27

HHI Post Merger

2. (10 pts.) Shown below are the AVC, ATC, and MC curves for one of several miniature golf courses in a large beach resort. Illustrate and label demand curves consistent with each of the following situations. Briefly explain your answers:
   a) D_1: It is wintertime and when we drive by the golf course, a sign says "closed for the season."
   b) D_2: It is springtime and the golf course is open. The owner tells us that she couldn't survive if business were like this all year round.
   c) D_3: It is the peak of the season, the parking lot is full, and the owner has a smile on her face.



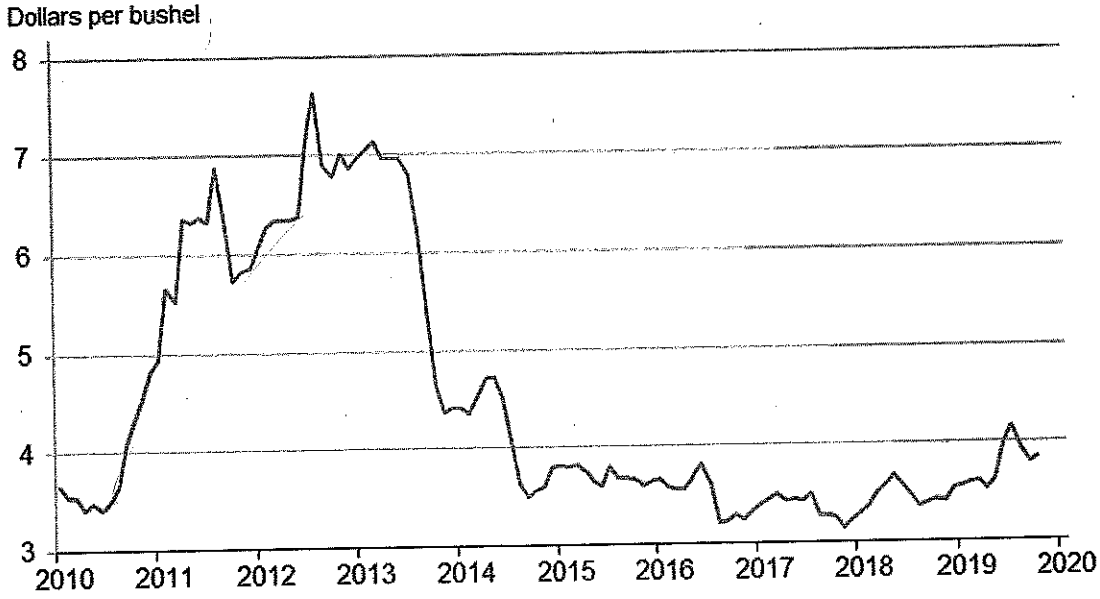
a) Demand in the wintertime is not high enough to cover average variable costs, so the choose to shut down. ✓

b) In the spring they stay open because they are making enough to cover variable costs. They are not covering their total costs however, so can only do this ✓ the short run until summer brings more revenue

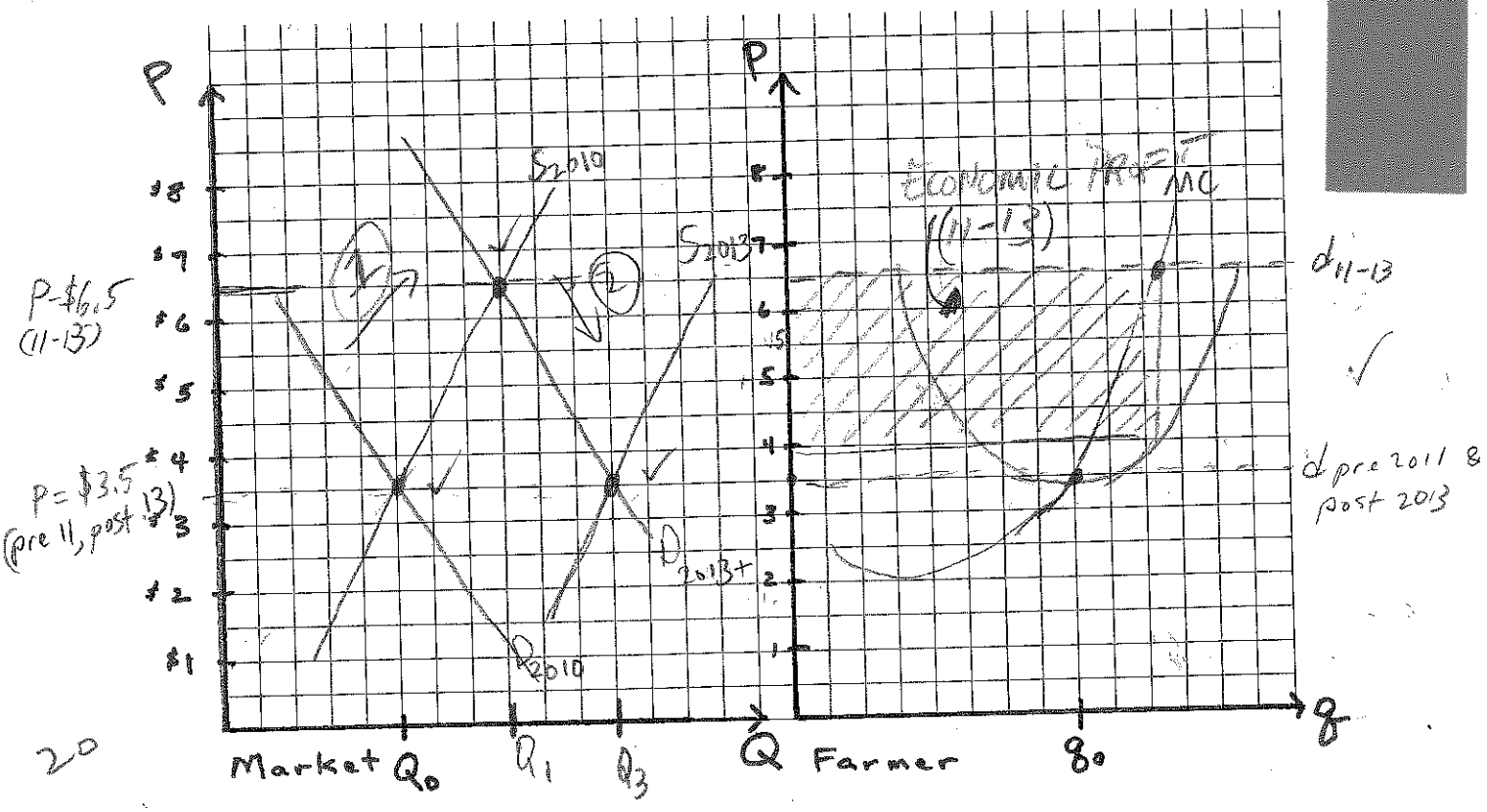
c) During the peak season, the owner is happy as she is covering her total costs and making a profit. ✓

3. (20 pts.) Assume that the market for corn in the U.S. was in long-run equilibrium in 2010. The typical farmer produced q_o bushels of corn, and market quantity exchanged was Q_o. Legislation was passed that mandated the use of ethanol in gasoline sold in the U.S. Most of the ethanol that was mixed with gasoline was produced using corn.
   (a) Based on the figure below, illustrate in the diagram on the next page the initial long-run equilibrium in the corn market and the situation of the typical corn farmer in 2010. Explain how market price and output are determined, and what output maximizes profit for the farmer. Also explain the economic profitability of corn farming in 2010.
   (b) Illustrate how the ethanol program affected the corn market in 2011-2013. Make sure your illustration is consistent with the price data contained in the figure below. Also illustrate the impact of these market changes on the output and profitability of the typical corn farmer. Explain your answers.
   (c) Now illustrate what must have been happening in 2014, 2015, and later years. Does the industry seem to be in long-run equilibrium again? Explain your reasoning. Make sure you show the optimal output and economic profitability of a typical corn farmer in the 2015-2019 period.

Prices Received for Corn by Month – United States



USDA – NASS
11/27/2019



a) In 2010 corn is a regular commodity selling at $3.5/bushel. There are a set # of players each making little returns and little or no economic profit. At supply/Demand equilibrium the price is found. At this price of $3.5/bushel there is very little economic profit and producers must sell huge volumes to make small profit with their low margins.

b) Post 2013 there is a step curve due to the sharp increase in demand (1) for corn/ethanol. The producers saw the greater demand and and with the supply not increasing as fast, they increased their prices. Economic profitability increased greatly and there were probably new entrants into the market to capture some of that profit. Larger output than 2010 but still not caught up to 2013 and beyond (@ Q1).

c) Yes, the market appears to be back in equilibrium. There is more corn being produced (Q3) and the price is back down to 2010 levels. Economic Profitability is back down to zero but with additional entrants that stay for the accounting profits.

4. (20 pts.) You are the only farmer in the area who grows cantaloupes. As such, when you take your melons to the local farmer's market, you are something of a monopolist. Your costs of growing cantaloupes are MC = AC = $2. The typical customer has a demand curve as follows. They will pay no more than $4 for a melon. If the price drops to $2, they will buy two melons. Only if you are giving them away will they demand three, since that is a lot of cantaloupe to eat in one week!
   (a) Illustrate the profit-maximizing price and output per customer for your cantaloupes.
   (b) Without using the arc elasticity formula for own-price elasticity of demand, can you determine the elasticity of demand at that point on the demand curve? Briefly explain the formula/approach you use to calculate your answer.
   (c) One Saturday, you show up at the farmer's market with your cantaloupes. It starts raining, and after an hour or so you realize that only half of the usual number of customers are showing up. Fresh cantaloupes do not age well, so anything you don't sell today will have to be thrown away. You understand the concept of BOGO (buy one at the regular price and get a second one at x% off.) How would you change your pricing strategy given these market conditions? Explain.

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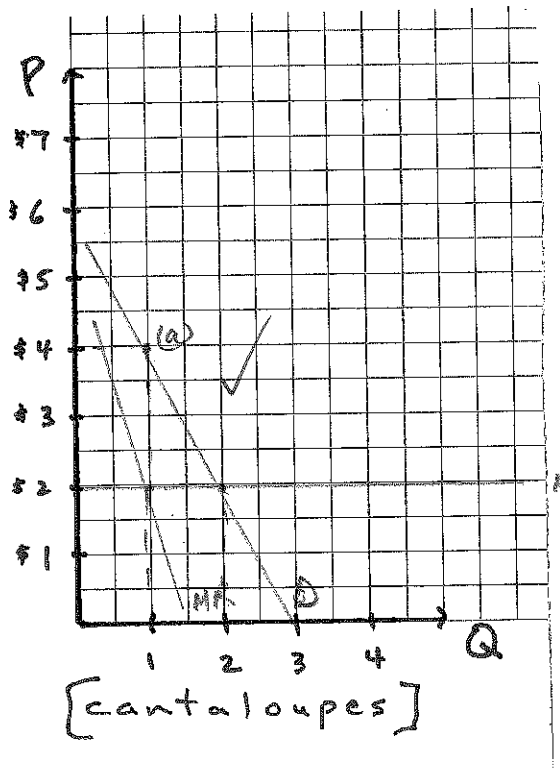

(a) Since MR = MC at quantity = 1. The profit maximizing price is $4 and 1 cantaloupe per customer. Point (a) in graph ✓

(b) Using Inverse Elasticity Rule,

$$\frac{P-MC}{P} = \frac{1}{\varepsilon}$$

$$\frac{4-2}{4} = \frac{1}{\varepsilon}$$

$$\frac{1}{2} = \frac{1}{\varepsilon}$$

$$\boxed{\varepsilon = 2} \checkmark$$

Hence demand is elastic.

(c) Since marginal cost is $2 which is 50% of $4 (profit price), it means if I sell a cantaloupe at $2, I make no profit since it covers only my cost. Hence when I implement BOGO, I will give any discount less than 50% on second cantaloupe if a customer buys one cantaloupe for $4.

OK

5. (15 pts.) You own and operate a gasoline station along Route 66 in eastern New Mexico in the 1960's, during the period when the television show "Route 66" was popular and long before the internet and other modern stuff. The next-closest gas station is five miles down the road, and there is not another gas station for forty miles in either direction. You and your rival must manually set the prices on the gas pumps each morning when you open. Then you must get on a step ladder and set the price on the sign out front. The payoffs to you and your rival are listed in the table below. Treat this as a simultaneous-move one-shot game. What price will you and your rival end up charging? Explain in a step-by-step fashion how you arrive at your answer, using the solution concepts we developed in class.

Dominated strategy for Rival ✓

		Your Rival		
		~~$0.279~~	$0.289	$0.299
You	~~$0.269~~	~~1, 2~~	~~1, 2~~	~~0, 3~~
	$0.279	~~4, 0~~	1, 3	0, 2
	$0.289	~~3, 1~~	(2), 1	1, 2
	$0.299	~~0, 2~~	0, 1	(2), 4

Dominated Strategy ✓

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Step 1 → Review best moves at each price from your perspective & from rival perspective and identify any dominant strategies. A dominant strategy is one that maximizes a players payoffs regardless of the strategy selected by the other player. I don't see any dominant strategies. ✓

Step 2 → Iterative elimination of dominated strategies: a dominated strategy is one that there is an alternative strategy that is in all cases better to play than this strategy. I crossed out the 2 dominated strategies identified. ✓

Step 3 → New Matrix & evaluate Rationalizable strategies. A rational player will not play a strategy that is never a best response to any strategy the other player might choose. The circles show what you would select as a reasonable player. The squares [ ] represent what a reasonable rival might select.

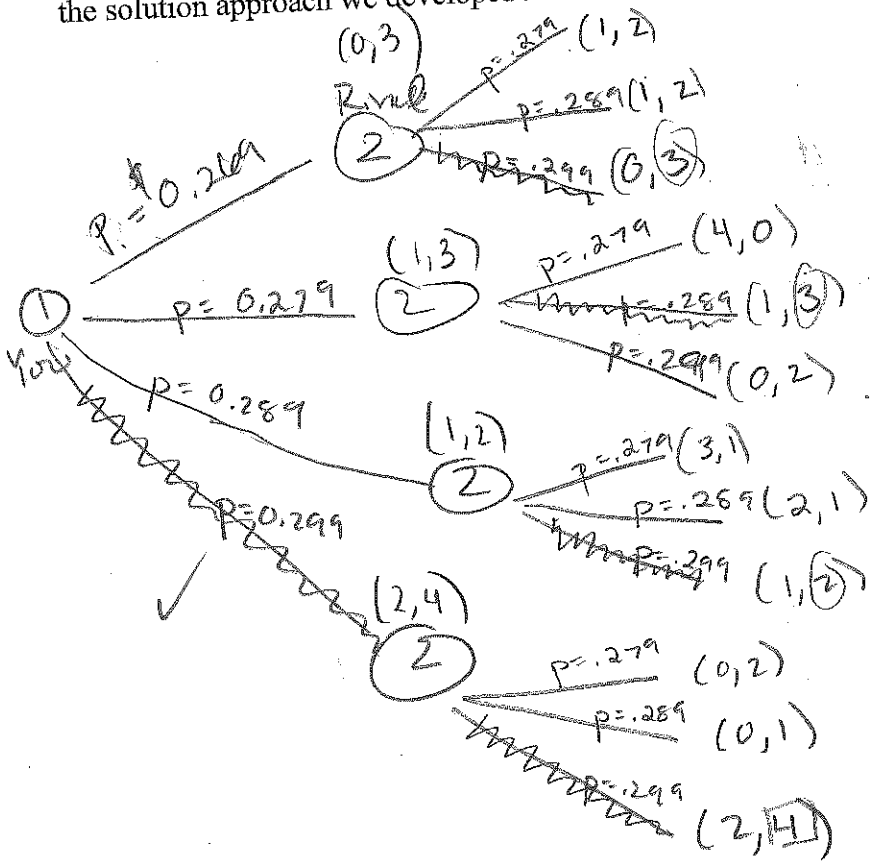
You \ Rival	0.289	0.299
0.279	1, [3]	0, 2
0.289	(2), 1	1, [2]
0.299	0, 1	(2), [4]

→ Nash equilibrium. You and rival will end up charging $0.299

Step 4 → Identify Nash equilibrium. A strategy profile such that each player's chosen strategy is a best response to the strategy selected by the other player (neither player will experience ex-post regret. At $0.299 you and your rival are at Nash equilibrium. ✓

6. (15 pts.) Suppose your rival drives by your gas station each morning on the way to open her station. She is able to observe your price, and then sets her own when she gets to work. So you are the first mover, and then she sets her price second. How will this game turn out? Draw the game tree and explain how each of you will choose your prices, using the solution approach we developed in class.

15



Starting with the pay offs in the terminal nodes I worked my way backwards ↑ backward induction by playing out my rivals choice first based on each possible choice. Then I selected the payoff strategy that was best for me given what I knew my rival would choose. Ultimately I would select a price of $0.299 as it maximizes my pay off at 2.

7. (10 pts.) Choose an industry from one of the required (or optional) outside reading describe and discuss the pertinent characteristics of market structure. Explain what of market structure it is.

10

Alligator market

The main market structures are:

(1) Number & size distribution of sellers: There are so many alligator farmers, the quantity that each produce or does not produce will have next to nothing impact on the elasticity of demand or price. Alligators farmers therefore will be price takers in a competitive market. No single farmer will be able to extract surplus from the market.

(2) Number and size distribution of buyers: There are several large buyers of alligator skins (most important supply) and meat. Companies that make shoes and bags, etc. Some large buyers may be able to negotiate lower price, otherwise farmers have options of who to sell to.

(3) Extent of product differentiation: There is next to none product differentiation in this market, so price elasticity of demand will be strong.

(4) Ease of entrant: When the market is indicating above normal economic profit, the market will attract new comers there is no significant barrier to entry. things balance out at the point of normal economic return.

(5) Availability of information: — In southern part of the US like Louisiana, Texas and Florida where Alligator farming is well established, information of how to start an Alligator, rear, feed, prepare product for market, safety etc are ubiquitous. The process of securing license available on government website, and schools are adding a portion on Alligator farming to Aquaculture Science.