

Name: **KEY**
ECON 202—Montgomery College
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EXAM 3

- There are 110 possible points on this exam. The test is out of 100.
- You have one class session to complete this exam, but you should be able to complete it in less than that.
- Please turn off all cell phones and other electronic equipment.
- You are allowed a calculator for the exam. This calculator cannot be capable of storing equations. This calculator cannot double as a cell phone.
- Be sure to read all instructions and questions carefully.
- Remember to show all your work.
- Try all questions! You get zero points for questions that are not attempted.
- *Please print clearly and neatly.*

Part I: Matching. Write the letter from the column on the right which best matches each word or phrase in the column on the left. You will not use all the options on the right and you cannot use the same option more than once.

2 points each.

- | | |
|--------------------------------------|---|
| 1. A Economies of scale | A. Average total costs fall as output expands |
| 2. I Elimination principle | B. Example: a baker's cost of flour |
| 3. C Fixed cost | C. Example: a game company's cost of designing a video game |
| 4. E Monopolistic competition | D. Example: buying things only to "keep up" with your peers |
| 5. H Nash equilibrium | E. Example: fast food companies |
| 6. D Prisoner's dilemma | F. Example: the cost of what you could have earned had you started a different business |
| 7. B Variable cost | G. Includes a normal amount of profit |
| | H. No one wants to change what they're doing |
| | I. Predicts all competitors, in the long run, earn the same average amount |

- If a firm expands its output, and the cost per unit falls, that's what we call economies of scale. It's one reason why small firms expand easily and large firms expand slowly. Large firms are likely running into constant or even diseconomies of scale.*
- If unusually large profits are eliminated by entry and unusually small profits are eliminated by exit, there's a natural equilibrium level of whatever the "normal" profit is. When that equilibrium is reached (the long-run), we expect all firms to, on average, make the same amount. Assuming perfectly competitive markets, of course.*
- This is a cost that doesn't expand as output expands. For a video game company, the cost of developing the video game is a fixed cost. It doesn't matter if one copy is sold or a million, the cost of making the video game is the same.*
- Monopolistic competition describes the (common) scenario of similar, but slightly different, competing firms. There's freedom of entry and exit, but not all products are identical. Fast food is a great example of this.*
- Holding everyone else's action constant, would you change your behavior? If everyone says "no", that's Nash equilibrium.*
- A prisoner's dilemma describes a scenario when the rational actions by individuals lead to a suboptimal result. Arms races and attempts at*

- collusion are examples. As is the endless “one-upmanship” of conspicuous consumption. If you save, you “fall behind” but everyone would be better off if everyone halved their spending and the signaling of prestige would be the same (as the signal is relative).*
7. *This is a cost that does expand as output expands. As a baker sells more product, she will have to buy more flour (assuming whatever she sells uses flour, which is very likely).*

Part II: Multiple Choice. *Choose the best answer to the following.*
4 points each.

8. The Dow Jones Industrial Average was founded in 1896 and composed of big companies that best representing the American economy. Only one of those companies is still on the list (General Electric), largely reflecting changes in the economy (though most of the original firms no longer exist). Which idea predicts this kind of industry-level turnover?
- Prisoner’s dilemma
 - Monopoly
 - Elimination principle
 - Barriers to entry
 - None of the above**

This is an example of creative destruction, the constant invention and purging that characterizes market economies. The nature of the US economy now is fundamentally different from that in 1896. (Original components of the DJIA included firms like American Sugar, National Lead, and Tennessee Coal and Iron.)

If you selected the elimination principle, keep in mind that idea predicts that all industries will be equally profitable; it does not predict any “churn” in the economy.

9. If a monopolistically competitive firm is making economic profits, what **must** happen in the long run?
- Demand shifts down until there are zero economic profits.**
 - Marginal cost shifts up until there are zero economic profits.
 - Deadweight loss increases.
 - A & C
 - None of the above

Monopolistic competition means there is entry if a firm makes unusually high profits. This causes the demand for that firm’s profits to shift down and this entry continues until there are zero economic profits.

Note that if you fiddle with the Monopoly Model (link on my website under “Research”), shifting Demand down does changes DWL very slightly: it decreases it. This is because one side of the DWL triangle is the distance between Demand and Marginal Revenue. The distance between the two increases as quantity produced increases. When Demand shifts down, quantity produced decreases which reduces that vertical distance and thus decreases DWL.

10. In the aftermath of the 2014 mudslide in Oso, Washington, NPR ran a story concerning mudslide insurance.¹ Mudslide insurance, like mudslides themselves, is rare. Why? Because the insurance is very expensive—up to \$1,000 per year, depending on the value of and risk to the home. According to Ron Fredrickson, manager of consumer advocacy at the state of Oregon’s Insurance Division:

Insurance is basically risk-sharing. In order for it to work — and for it to be reasonably affordable — you have to have a large number of similar units that have similar possibilities of loss.

In other words if more people bought mudslide insurance, mudslide insurance would be much cheaper. What does this information suggest about the mudslide insurance industry?

- a. It has diseconomies of scale
- b. It has decreasing marginal cost
- c. It has economies of scale**
- d. A & B
- e. None of the above

The more people who buy mudslide insurance—the more people the insurance company covers—the cheaper mudslide insurance becomes. This bears a striking resemblance to our LRAC: as quantity provided increases, cost-per-unit provided decreases. This is economies of scale.

Given how few people are interested in mudslide insurance—independent of price—it is likely mudslide insurance would be a natural monopoly. But no firm exclusively provides the insurance (you get it through firms which insurance unusual items such as collectibles) so it’s tricky to see it in practice.

11. How do monopolies make greater than average profits?
- a. By reducing the quantity sold.**
 - b. By forcing people to buy their good.

¹ <http://www.npr.org/2014/04/08/300267934/natural-disasters-are-rare-but-so-is-mudslide-insurance>

- c. By not having to spend any money on advertising.
- d. B & C
- e. None of the above

Artificially reducing how much is available in the market causes the price of the good to rise. Without competition, there is no one to undercut them or out-produce them.

12. Which of the following is an example of a natural monopoly?
- a. Oil
 - b. Diamonds
 - c. Power generation**
 - d. A & B
 - e. None of the above

Natural monopolies are not about natural resources; they are about economies of scale. Neither a single oil company nor a single diamond company could supply the whole demand curve with a downward sloping ATC curve. But power generation, because it requires wiring individual homes and businesses to a network, have most of its costs reflected in infrastructure. Thus, its ATC is always downward sloping for its whole market. (This explains why you only have one electrical company to choose from when you purchase power.)

13. Consider the game below. What could X be to ensure there are no Nash equilibria? (Note there are two Xs, meaning the payoff for each X would have to be the same.)
- a. 1
 - b. 3**
 - c. 5
 - d. A or C
 - e. None of the above

		Zuko	
		Defend	Attack
Aang	Defend	X, 3	7, 4
	Attack	2, 4	8, X

If you choose 1, Aang would stay at Attack if Zuko Defends ($2 > 1$) and Zuko would stay at Defend if Aang Attacks ($4 > 1$); thus Attack/Defend is NE.

If you choose 5, Aang would stay at Attack if Zuko Attacks ($8 > 2$) Zuko would stay at Attack if Aang Attacks ($5 > 4$); thus Attack/Attack is NE.

But you won't get a Nash Equilibrium if you choose 3.

		Zuko	
		Defend	Attack
Aang	Defend	3, 3	7, 4
	Attack	2, 4	8, 3

14. Which of the following scenarios is an example of a prisoner's dilemma?
- Robbing a bank: one player is a robber (choosing between robbing and not robbing) and the other is the bank (choosing between high and low security).
 - An arms race: the two players are countries (each choosing between a lot of military spending and a little military spending).**
 - A penalty kick in a soccer game: the two players are...players (the goalie chooses where to try to block the ball and the kicker chooses where to kick the ball).
 - Meeting for lunch: the two players are old friends (each choosing between going to a coffee shop and going to a restaurant).
 - None of the above

Both A and C are between two inherently opposing groups with no incentive for cooperation. For example, if the robber decides to rob the bank, the bank will want high security; that means the robber won't want to rob the bank which means the bank will want low security; that means the robber WILL want to rob the bank so the bank is back at high security... Similarly, any place the goalie tries to block is a place where the kicker doesn't want the ball to go. Any place the kicker decides where to kick the ball is a place the goalie wants to go.

Option D does not have one but two stable points of cooperation: both players can go to the restaurant or the coffee shop. The prisoner's dilemma has only one NE. There is no incentive to defect, either.

Option B is the best choice: both countries would be better off if they cooperated and built small militaries. But both sides have an incentive to defect on this arms race and build big militaries. If one builds a small military, the other will want a big one (so it can crush the small one). If one builds a big military, the other will want a big one (so it can defend itself). Big/Big is NE. But if they both built small militaries, they would be on equal footing militarily-speaking but have save a lot of resources. (Note unlike the bank with the robber or two sides of a soccer match, two countries can get along.)

15. The iconic blue-and-white Chinese porcelain sold to people all over the world (particularly between the 14th and the 16th centuries) was so successful, entrepreneurs in Persia, Netherlands, Syria, Iberia, Mexico, and many other areas attempted to copy it. The actual process for creating such high quality ceramics was kept secret but in 1708 a German alchemist finally found a way to replicate it the ancient art. What do you expect happen to the price of porcelain after 1708 and why?

- a. **It should fall, because of the increased competition.**
- b. It should fall, because of the lower cost to create Chinese porcelain.
- c. It should rise, because of the greater difficulty in keeping the method a secret.
- d. It should not change at all because demand and supply will react accordingly.
- a. None of the above

As suggested by the fact that the method of creating the porcelain was kept secret, by discovering the secret the price of porcelain should fall due to competition. Note that this discovery does not decrease the price of producing the good. It only increased competition.

16. In November 2012, Apple made an agreement with cell phone maker HTC to stop suing each other for patent violation. That agreement immediately terminated all patent litigation pending against each other and the two agreed to a 10-year cross-licensing agreement. For the next decade, HTC is free to use any Apple patents and vice versa without charge. This creates an opportunity for either company to invest less in R&D and simply free ride off the inventions of the other firm. Why *wouldn't* either company do this? (HINT: This is a prisoner's dilemma set up; recall repeated play solves the dilemma.)
- a. **Because they'll negotiate a new agreement in ten years and no one wants to share with someone who doesn't contribute.**
 - b. Because technology is really important to making a profit.
 - c. Because both parties are risk-averse: cheating will surely lead to a punishment as cooperating will lead to a reward.
 - d. B & C
 - e. None of the above

The ten-year time limit is an example of repeated play, meaning both parties know they will play again. It's reasonable to assume there's some sort of strategy in place (most likely grim) so that incentivizes both parties not to cheat. While this is similar to option (C), it does not require risk aversion as the option suggests.

17. Why is the average fixed cost always decreasing as quantity increases?
- a. Because fixed costs don't change.
 - b. Because variable costs are constant.
 - c. Because average fixed costs are determined by dividing by quantity.
 - d. **A & C**
 - e. None of the above

The equation for average fixed cost is $\text{Fixed Cost} / \text{Quantity}$. As Quantity increases, Fixed Costs are the same so the equation is always decreasing.

18. In July 2011, oil companies had a 6.5% profit margin (for each dollar of sales, 6.5 cents was profit), ranking 131. Other industries making the same profit margin included packaging & containers, office supplies, farm & construction, and newspapers. Assuming these profits are typical, what does this constant profit margin across very different industries suggest about oil companies' economic profit?
- They are making above-average economic profit and should expect entry.
 - They are making above-average economic profits but should expect no entry or exit.
 - They are making zero economic profit.**
 - Nothing because it is the total revenue that matters, not profits per dollar of sales.
 - None of the above

If they are making the same amount in oil production as they could anywhere else, then accounting profit equals opportunity cost, which means economic profit is zero.

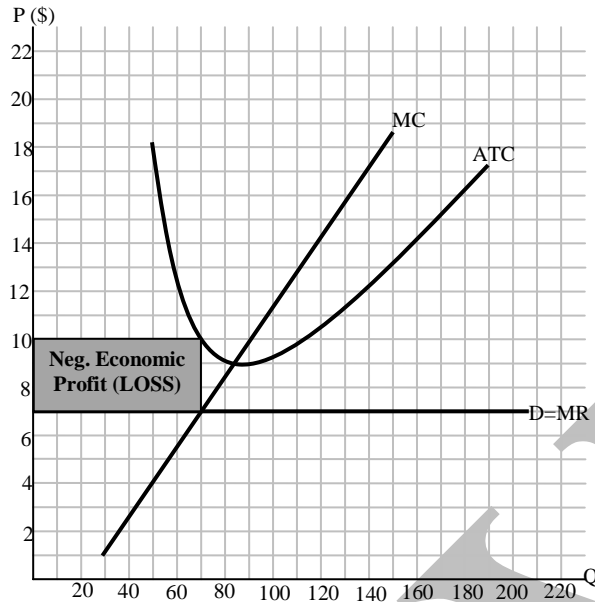
19. Which of the following is an example of a fixed cost for a T-shirt business right when it gets started?
- Building a factory**
 - Purchasing more fabric for T-shirts
 - Hiring additional workers
 - A & B
 - None of the above

Both B and C are examples of variable costs. With the business just starting, the cost of a factory will not vary with output.

Part III: Short Answer. *Answer the following.*

16 points each.

20. Consider a perfectly competitive firm. Using the graph below, indicate where the firm produces, where it makes a profit/loss and how much it is, if it should anticipate entry or exit, what price it sells its good, the price it will sell its good in the long-run, and any deadweight loss, if applicable.



The firm makes 70 units and sells at \$7. There is no deadweight loss in this model as $MR = Demand$ and $Demand = MB$; what's in the interest of the firm is in the interest of society.

It should anticipate exit from the market because it has negative economic profit. In the long-run, prices will rise and this firm (or one just like it) will have zero economic profit (at a price of around 9, where $ATC = MC$).

21. Circle the Nash equilibrium/equilibria (NE) of the following games. If there aren't any, check the box. (4 points each)

		Nazi Germany		<input type="checkbox"/> No NE
		<i>Attack North</i>	<i>Attack Central</i>	
France	<i>Defend North</i>	2,-2	-3,3	
	<i>Defend Central</i>	-5,5	4,-4	

In this game, there is no Nash equilibrium. The Nazis want to go where France isn't and France wants to go where the Nazis are. (By the way, what happened was that France Defended North and Nazi Germany Attacked Central in the Battle for France.)

		Sam		<input type="checkbox"/> No NE
		<i>Buy</i>	<i>Sell</i>	
Alex	<i>Stay</i>	5,5	3,6	
	<i>Run</i>	7,2	0,8	

Stay and Sell is NE. Sam won't want to go from 6 to 5 and Alex won't want to go from 3 to 0. All other points gravitate to this one.

C)

		Ingen		□ No NE
		Up	Down	
Initech	Love	2,2	0,3	
	Hate	3,0	1,1	

This is the prisoner's dilemma, though I gave the strategies some random names to mask it.

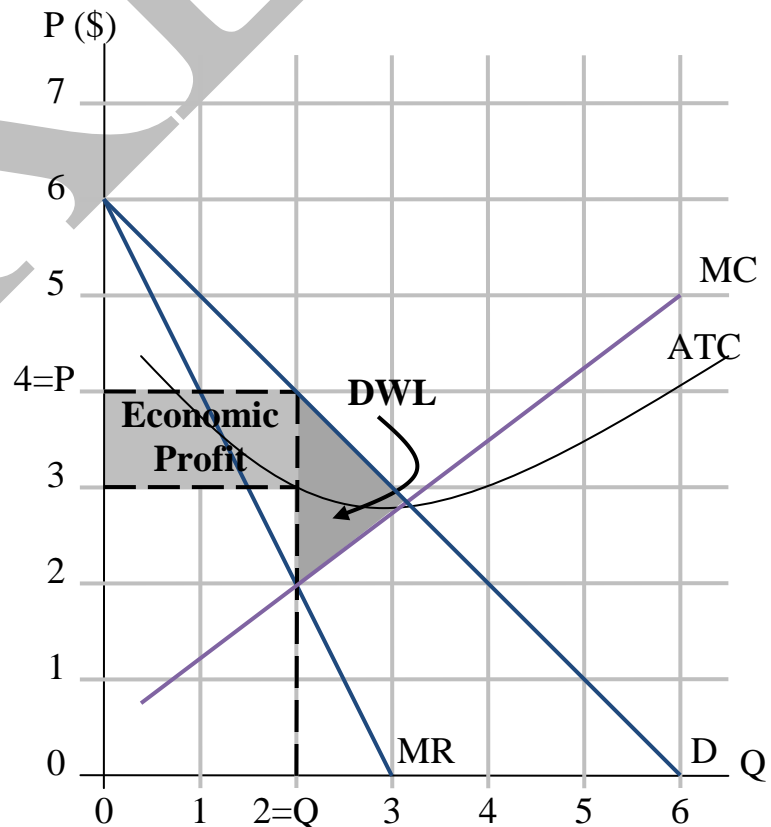
D)

		Betty		□ No NE
		Rabbit	Stag	
Alice	Rabbit	1,1	1,0	
	Stag	0,1	3,3	

This is a game called the stag hunt. Each player can go for a rabbit or a stag. You can be successful going after the rabbit alone but you need help to go after the stag. The stag hunt is sometimes brought up in management theory, the idea being employees could be stuck doing small things individually and the manager's job is to get them to cooperate and go after the stag. But, unlike the prisoner's dilemma, cooperation is Nash equilibrium; it's easy to maintain cooperation once you get it established.

22. Consider a long standing monopoly. Using the graph below, indicate where the firm produces, where it makes a profit/loss and how much it is, if it should anticipate entry or exit, what price it sells its good, and any deadweight loss, if applicable.

The firm makes two units, selling them at \$4 each and costing them \$3 each to make. The firm makes a total profit



of \$2. Despite its profit making status, there will not be entry since the monopoly is long standing: there is clearly some form of barriers to entry at work.

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