

NET 2021 Power Round

Milgrom Division: Microeconomics

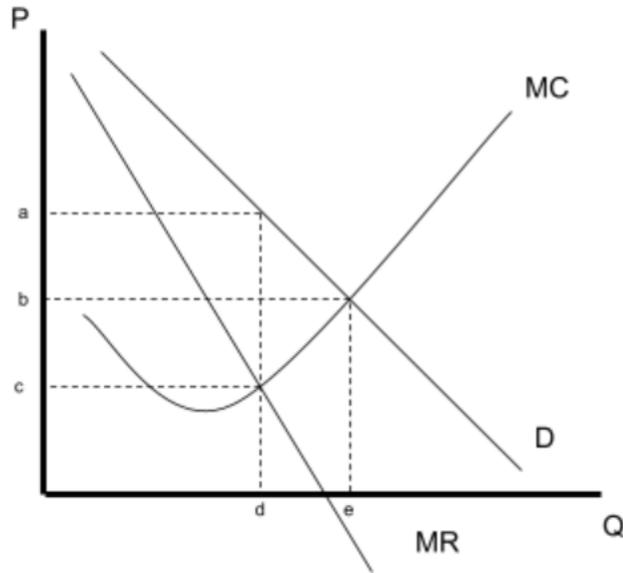
April 2021

Instructions

This is the **microeconomics portion** of the Milgrom division of the 2021 Northwestern Economics Tournament Power Round. There are three questions of *unequal* weight, accounting for a weighted *half* your score for the Power Round. You are encouraged to work together on these questions. Answer each question as clearly and succinctly as possible. You may write on a blank sheet of paper where you *clearly indicate* where your answer to each part is. If you are unsure of your answer, take your best guess: there is no penalty for incorrect answers. It is recommended you spend approximately an hour on this portion. Remember, we do *not* share your answers or scores with Northwestern admissions, nor do we keep them for ourselves. You are not expected to know how to answer each question on the exam; rather, this test is designed to assess your economic and formal reasoning skills. Have fun, and good luck!

Problem 1: The Marginal Monopolist's Market Moves (29 Points)

The graph above shows the marginal cost (MC), demand (D), and marginal revenue (MR) curves for a market with one firm and infinitely many consumers.



Part A (2) Explain the shape of the marginal cost curve.

Part B (2) Explain why the marginal revenue curve declines faster than the demand curve.

Part C (2) At what quantity and price does this market operate? Is this efficient? Why or why not?

Part D (3) On your answer paper, copy over the above graph (It does not need to be perfect! Just the same general shapes are fine). Add an average total cost curve such that the firm is productively efficient. Then, define productive efficiency.

Part E (4) The firm produces widgets with a negative externality. Define negative externality of production and give an example. Explain one action the government could take to reduce or eliminate the externality.

Part F (2) On your graph, add a marginal social cost curve that takes into account the negative externality.

Part G (3) If the firm was forced to internalize the externality, but was still allowed to operate as a monopoly, where would it produce?

Part H (2) What is the socially optimal level of production?

Part I (6) There are many ways to force markets to operate at efficient levels, but they are not equally applicable to every situation. For each of the policies below, explain in 2-4 sentences why it would or would not help the market achieve the optimal level of output:

- An educational campaign on the dangers of producing widgets.
- A tax for every widget produced.
- A ban on the production of widgets.

Part J (3) Of the policies suggested above, which is the most effective? Why?

Problem 2: Wait! I (won't) get it done tomorrow (12 Points)

Part A (*Exponential Discounting*) (3) One of the things that we humans often prefer is to consume now rather than later. Ideally economists discount the future value of an object exponentially. For example, if I know I am going to receive a \$1000 in 5 years, and my annual discount factor is 0.95, that means that the present value of \$1000 in five years is $(0.95)^5 * 1000$, which is the minimum amount of money that I would like to receive right now to give up the \$1000 in 5 years. We call d^t the discount factor and d^{t*} (future value) the present value of the future asset. Now, suppose my annual discount factor is 0.9. In the present, do I prefer receiving \$1000 in 4 years or receiving \$1100 in 5 years?

Part B (*Hyperbolic Discounting*) (3) In reality, people might use a different discounting system, which skews upward payoffs in the more recent future. The formula is (discount factor) = (future value)/(1+t*k), where k is a parameter that represents my preference. Suppose k = 0.1, explain which of the following options is better today (in 2021): \$1050 in 2026 or \$1101 in 2031.

Part C (*Regretting*) (2) In 2026, I offer you the same option as the above: \$1050 right now or \$1101 in 2031. If you use hyperbolic discounting, explain which option you prefer now. (Hint: it might be easier to put 2026's value in 2031 terms instead of doing division)

Part D (*Time Consistency*) (4) Consider only two options: v_1 in t_1 years and v_2 in t_2 years, where v_1 and v_2 are positive and t_1 and t_2 are positive integers. Suppose without loss of generality that $t_1 < t_2$ and that your annual discount factor is d . Show that, between now and year t_1 , your preference will not flip between these two options. In other words, if you prefer the v_1 offer now, you will continue to prefer the v_1 offer up to year t_1 . Similarly, if you prefer the v_2 offer now, you will continue to prefer the v_2 offer up to year t_1 . (Hint: consider your preference at year 0 and at an arbitrary year t between 0 and t_1)

Problem 3: The Perfectly Competitive Firm (9 points)

Suppose a firm produces widgets in a perfectly competitive market. The market price of a widget is \$20 and the firm has the marginal cost equation $MC = 10 + Q$.

Part A (2) How much profit will the firm make in the short run? Show or explain how you got your answer.

Part B (1) At equilibrium, what is the average cost of producing a widget?

Part C (2) What are 2 assumptions made about perfectly competitive markets? Explain each in 1-2 sentences.

Part D (4) Perfectly competitive markets do not exist in the real world. However, economists study perfectly competitive markets extensively. Explain two reasons why.