

ECON 1201 Problem Set #7

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1 Production Under Perfect Competition

Consider the problem faced by Alice, the owner of a small restaurant in Stockbridge, Massachusetts. In the short run (this week), her scale of production is fixed with respect to all factors except labor: she can hire as many hours of help as she wants at \$10 per hour. Her fixed costs (all of which are unavoidable) total \$10000 per week.

Alice's production of meals this week is described by the function

$$Y = 100\sqrt{L}$$

where Y is meals served per week and L is hours of labor hired.

Graph the production function above (for 0 to 900 hours of labor input). Explain what is meant by "diminishing marginal returns" to a factor of production and illustrate using this production function.

Calculate Alice's total cost of producing 200, 300, and 400 meals per week. Does this production function result in "increasing marginal costs"?

Construct a table with some sample levels of production (you probably want to try increments of 200 or so) and the associated Total Fixed Cost, Total Variable Cost, Total Cost, Marginal Cost, Average Fixed Cost, Average Variable Cost, Average Total Cost, and Marginal Cost. (Remember: we are looking for the costs per meal, not per 100 meals.) Also show MC, AVC, and ATC on a graph.

Now suppose that there are a large number of restaurants in Stockbridge, all of them too small to affect the price of meals, and that meals are a homogeneous good. Assuming that the market clears at \$10 per meal, so that Alice can sell as many meals as she wants at \$10 each, what is Alice's total revenue and profit at 200, 300, and 400 meals per week? Graph Alice's total revenue and total cost.

How many meals will Alice choose to produce this week? What is her profit (or loss) at this level of production? Suppose instead that Alice must pay \$20 per hour to hire labor. How will this change Alice's production decision and profit?

2 Production Under Monopoly

Thanks to its founder's pioneering research, Scanlon Pharma Inc. is the only maker of SnotBgone, an FDA-approved pill that instantly cures the common cold. SP holds a patent that expires in five years and is just beginning production of SnotBgone today. Suppose the demand for Snotbgone is described by the function $q = 12 - p$ (where p is the price per pill in dollars and q is millions of pills per year), and that Scanlon Pharma can produce pills at a constant marginal cost of \$2 each. All fixed costs of research, development, testing, etc. (which totalled \$80 million when they were incurred in previous years) are already sunk; assume that yearly fixed costs are \$0.

Graph the demand and the total revenue for quantities of 0 to 12 for SnotBgone. At what price and quantity would SP's sales of SnotBgone be the highest?

What price p^m and quantity q^m maximizes SP's profit from SnotBgone? What is the deadweight loss at this price? What is the socially-efficient price p^c and quantity q^c ? What is the price elasticity of demand at p^m ?

Suppose you're a lobbyist for SNOT (Sufferers of Nasal Occlusions Today), a group dedicated to eradicating the common cold. Construct an argument supporting government intervention in the market for SnotBgone. In other words, what's wrong with p^m ?

Now, suppose instead that you're a lobbyist for SP, hired to defeat a proposal by Congressman Blarney Flank that SP be taxed on its "windfall profits". Construct an economic argument for why Congress shouldn't pass Flank's bill.

Finally, suppose that you are an adviser to President Obama asked to propose a resolution to this debate. What government policy might achieve SNOT's goals without the undesirable effects of Flank's proposal? Be as specific as possible.

3 Pricing under Oligopoly

The market for coffee in Storrs is served by two suppliers: Sternedreck and Liztastic. Each can simultaneously choose to charge \$2 or \$1 per cup tomorrow. If they both charge \$2, they each make \$100 profit. If they both charge \$1, they each make \$50 profit. If one charges \$2 while the other charges \$1, the one who charges \$2 makes \$0 profit while the one who charges \$1 makes \$150 profit.

Draw the normal form of this one-shot game and identify the Nash equilibria. Is this outcome Pareto efficient? Now suppose instead that Sternedreck opens first and Liztastic can observe the price charged before choosing her own price. Draw the extensive form of this one-shot game and identify the Nash equilibria. Finally, suppose that the two suppliers play this same game every day forever. How might this change the outcome of the game?