Intermediate Microeconomics

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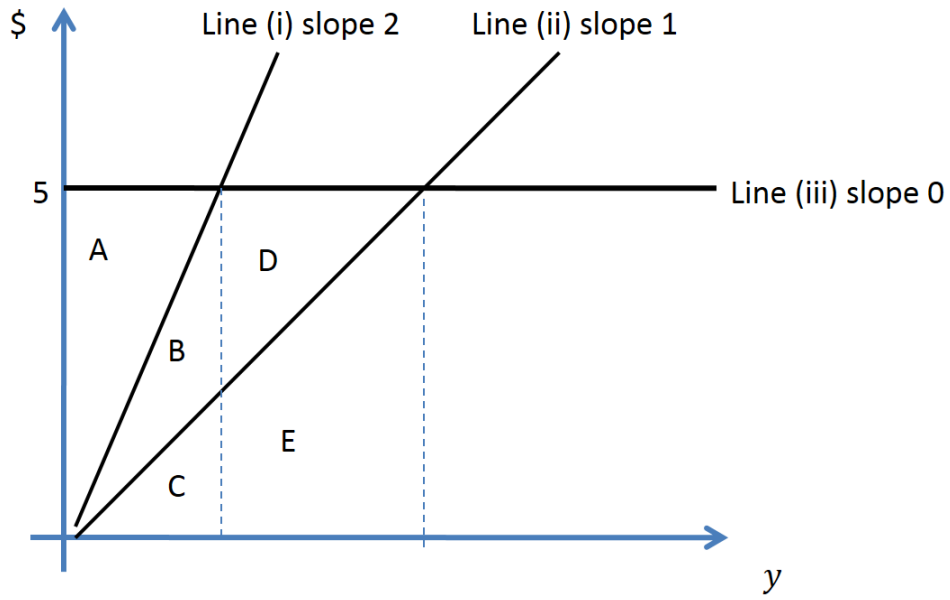
Homework 7

Due Wednesday, 6th April

Question 1 Consider a firm with a production function $f(x_1) = x_1^{\frac{1}{2}}$, who faces wages equal to 1 and price for their good equal to 5. Now look at the figure below



This figure has three lines (i, ii and iii) and 5 labelled areas (A, B, C, D and E).

1. Which line is the marginal revenue line? Which is the average cost line? Which is the marginal cost line?
2. Assuming that the firm maximizes profits which area (or sum of areas - e.g. A+C+E) is equal to total revenue?

3. What areas are equal to total cost?

4. What areas are equal to profit?

Question 2 New York Hipster Corporation produces Hipsters (h) using coffee (c) and fishing hats (f). their production function is $h = c^{\frac{1}{4}} f^{\frac{1}{2}}$. The cost of coffee is 2 and fishing hats is 3. they can sell hipsters for p_h each (note that we are not restricted to 'whole numbers' of coffee, fishing hats, or hipsters so we can, for example, have 0.75 of a fishing hat)

1. In the short run, the NYHC has leased $\bar{f}$ fishing hats, which they have to pay for however much they produce. Their only choice is how much coffee to buy. On one graph, show their total cost and total variable cost functions. On another, show their marginal cost, marginal revenue, average cost and average variable cost. What is their profit maximizing output (as a function of $\bar{f}$ and p_h)? Will they always make positive profits at that output? Will they ever choose to produce zero output?

2. In the long run, NYHC can pick both the amount of fishing hats and the amount of coffee they can use in production. Does the firm now have any fixed costs? Reproduce all the graphs from part 1, and recalculate profit maximizing output (this time as a function of p_h alone). How does the marginal and average costs in the short run compare to those in the long run? How does profit maximizing output compare?

Question 3 Here are a set of things to prove:

1. For a firm with fixed costs, the marginal cost curve passes through the lowest point in the average cost curve AND the lowest point in the average variable cost curve

2. If we double the price of inputs to a firm then its cost function doubles at every level of output

3. A firm that faces fixed cost F will not change their output decision in response to a change in F