Econ 101: Principles of Microeconomics   Fall 2012

Professor Wallace

Homework #7

Problem 1: For each of the following claims, please state if it is true, false or ambiguous. Then argue why you believe that the claim is true, false or ambiguous.

(1) I decide to get an MBA and quit my job as an accountant. My explicit cost to go to graduate school is the sum of tuition and forgone salaries that I would have earn as accountant.
False, only the tuition is an explicit cost. The forgone salaries are implicit costs.

(2) My production function uses only two inputs and these inputs are perfect complements, therefore my production function exhibit Constant Return to Scale (CRS)
True, a production function with perfect complement inputs is CRS because if a double both inputs I will double my production.

(3) John owns a sandwich cart on the Capitol Square. Each sandwich has two slices of bread, a slice of cheese and a slice of ham. I can say that my production function is a Cobb-Douglas.
False, in this case my inputs are perfect complement therefore the production function would be $F(B,H,C)=\min\{B/2,H,C\}$

(4) I am in the short-run and the amount of capital is fixed. I pay my workers a salary of \$20. The parginal product of labor (MPL) is increasing; therefore the marginal cost is increasing.
False, the marginal cost is decreasing. Given that my variable cost is constant but my marginal product of labor is increasing each of my unit would cost me less.

(5) In the long run I use an equal amount of capital and labor to produce basketball shoes. Capital and labor have the same price per unit. After the cost of capital doubled I use only labor. My input must be perfect substitute.
True, the inputs are perfect substitutes. The production function is linear $F(L,K)=aL+bK$ where $a=b$. Given that after the change in the capital is more expensive the most efficient production plan is produce only with labor.

Problem 2: Roger, David, Nick and Richard own a coffee shop called "The Wall" on Regent Street. The production function uses only two input Labor (L) and Capital (K). The following chart displays the relevant information about production:

L	K	Q	MPL	APL
4	0	0	-	-
4	1	3	3	3
4	2	8	5	4
4	3	15	7	5
4	4	28	13	7
4	5	45	17	9
4	6	60	15	10
4	7	70	10	10
4	8	72	2	9
4	9	72	0	8
4	10	70	-2	7

(1) Is the "The Wall" in the long run or in the short run?
It is in the short run because Labor is fixed.

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(2) Calculate the Total Production (Q), the Marginal Product of Labor (MPL) and the Average Product of Labor (APL) for each quantity of labor.
See the chart

(3) Draw on the same graph the MPL and the APL. Which is of the two curves is flatter. What is the intuition behind this result?
The APL is flatter because it uses as denominator the overall production, then it will average out the different peaks and deeps in the MPL. Instead the MPL use as denominator the increases measure only the increase in the productivity due the additional unit of input, in this case labor. The MPL will always lead the movement of the APL curve.
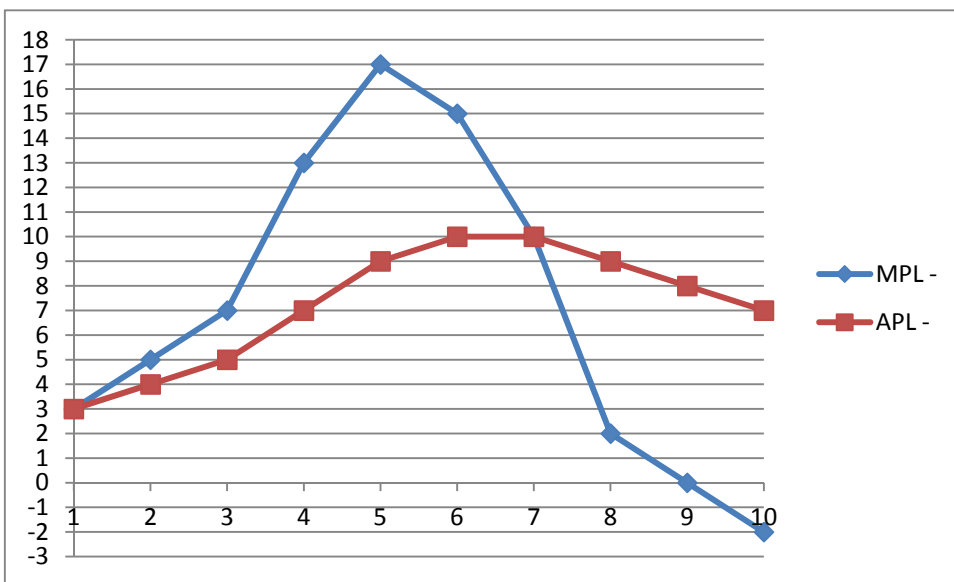
(4) Find the quantity of labor that maximizes the MPL.
The amount of labor that maximizes the MPL is 5. The value of the MPL is 17.

(5) Explain the intuition behind the MPL becoming negative.
The MPL can become negative because it maybe possible that adding too much capital (i.e. coffee machines) the workers would be not able to manage them all together. At this extreme the additional unit of capital is even detrimental because it will induce a reduction in the production.

Problem 3: Phillip decides to produce handcrafted watches in his basement. He sells them at local fair each month. He hires local high school student to help him out with the production. The following chart displays the relevant information about cost and revenue:

L	Q	TC	ATC	MC	Total Revenue (TRN)	Marginal Revenue (MRN)	Average Revenue (ARN)	PROFIT
0	0	200	-	-	-	-	-	-
1	4	240	60	10	80	20	20	-160
2	14	280	20	4	280	20	20	0
3	22	320	14,55	5	440	20	20	120
4	26	360	13,85	10	520	20	20	140
5	28	400	14,29	20	560	20	20	160
6	29	440	15,17	40	580	20	20	140

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(1) Assuming there is a unique wage in the market. What is it?

The wage is $40. It can be calculated taking the difference between the total cost between the zero production and when we use one unit of labor. We have that $240-$200=$40

(2) Calculate the total cost (TC), the average total cost (ATC) and the marginal cost (MC) for each quantity of labor.

See the chart.

(3) Draw on the same graph the ATC and MC curves.
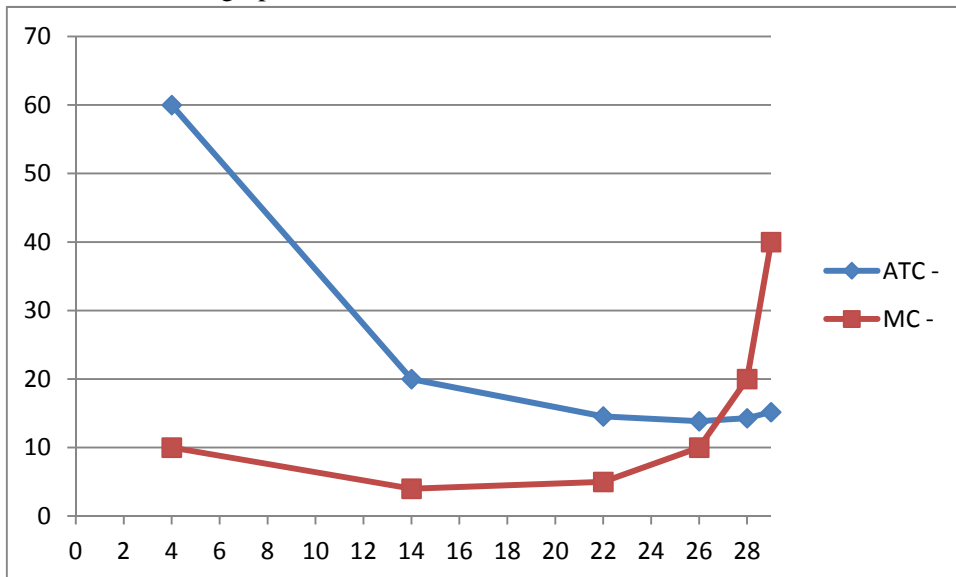
(4) Assuming there is a unique price in the market. What is it?

We know that there is a unique price in the market. We can calculate it taking the ratio of the TRV and the Q when we are using one unit of labor. The price is 20.

(5) Calculate the total revenue (TRN), the average revenue (ARN), and the marginal revenue (MRN), for each quantity of Labor.

See the chart.

(6) Calculate the profit for each quantity of labor.

See the chart.

(7) For a low level of production Philip is losing money, explain why this is happening.

In the beginning Philip has to cover to fix. He needs to sale a certain amount of watches to cover these costs. Once the scale of the production increase the Average Fixed Cost would drop making for him profitable produce.

(8) When the MC is minimized? When are the Profit maximized? Are they the same? What is the intuition behind it?

The MC is minimized using 2 units of Labor, producing 14 watches. In this case the MC is 4. The profits are maximized 5 units of labor, producing 28 watches. In this case the MC is 20. There are not the same. Phillip would increase is production until the point the additional watch sold will give a revenue bigger or equal the production cost of that unit, MRV=MC. At that point it would not increase anymore his profits increasing the production.

(9) Draw on the same graph the ARV and MRV curves together with the ATC and the MC. Comment the graphs in the lights of the previous answer.

We should notice two thinks. First, the ATC cross the Price (in this case equal to the MRV) when the firm breakeven and starts to make profit. Below that production level for Philip is not profitable to produce.

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Second, the profit is maximized at the intersection of MC and MRV. The reasoning is similar the previous answer, increasing production when then MC>MRV reduce the profit and vice versa if MRV>MC increase the production would increase the profit. The profit will be all the are between the MRV and the MC.