Discussion 7

Important Topics

- Profits and Economic Costs
- Graphing TPL, MPL, APL
- Firm Choice of Technology

Profits and Economic Costs

Exercise 1 Sam decides to start a business selling candies to college students. To get into this business, he needs to rent a store on the University Avenue with rent \$500. In addition, he needs to hire a helper and pay her \$400. If Sam choose not to open up the candy store, he could have worked in a chocolate factory and earn a salary of \$1000. The demand curve of college students (per month) is given by $P = 10 - 0.01Q$. Each candy costs \$2 from the supplier.

(a) If Sam sets price at $P = \$6$, what is his profit? What is his economic profit?

From the demand curve, we can derive the inverse demand curve $Q = 1000 - 100P$. If Sam sets price at $P = 6$, he can sell 400 candies. Therefore, the revenue is given by $400 \times 6 = 2400$. The total cost is given by $500 + 400 + 400 \times 2 = 1700$. For total economic cost, we also need to count the opportunity cost of Sam, which is \$1000, i.e. total economic cost is \$2700. Therefore,

$$\text{profit} = \text{total revenue} - \text{total cost} = 2400 - 1700 = 700$$

$$\text{economic profit} = \text{total revenue} - \text{total economic cost} = 2400 - 2700 = -300$$

(b) What price should Sam choose to maximize revenue and what is his profit at that price? Is profit maximized at this price? (Hint: price elasticity of demand)

We know that total revenue is maximized when the price elasticity of demand is -1. Therefore Sam would set $P = 5$ to maximize total revenue. At that price, he can sell 500 candies. His profit is given by

$$\begin{aligned}\text{profit} &= \text{total revnue} - \text{total cost} \\ &= 5 \times 500 - (500 + 400 + 500 * 2) \\ &= 600\end{aligned}$$

Use the result from question (a), we notice that although revenue is maximized at $P = 5$, profit is not maximized. By charging $P = 6$ Sam can get higher profit since $\$700 > \$600$,

Graphing TPL, MPL, APL

Exercise 2 The Old Fashioned has the following relationship between the number of chefs in the kitchen and the number of dishes they can cook:

# of Chefs	# of dishes	MPL	APL
0	0	-	-
1	10	10	10
2	24	14	12
3	30	6	10
4	32	2	8
5	25	-7	5

(a) Complete the columns Marginal Productivity of Labor (MPL) and Average Productivity of Labor (APL).

(b) Draw Total Productivity of Labor (TPL) in graph 1. Draw MPL and APL in figure 2.

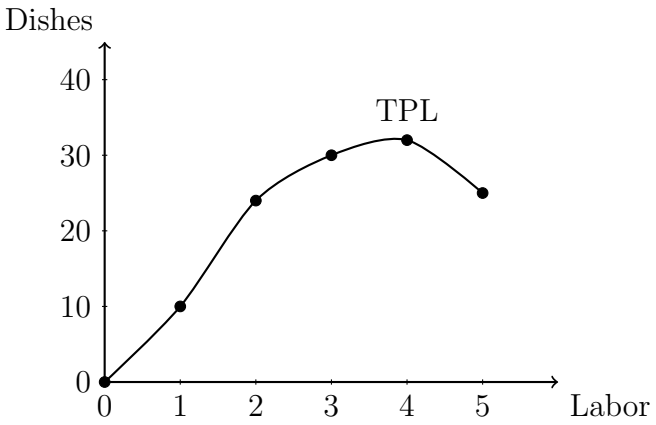

Figure 1: Graphing TPL

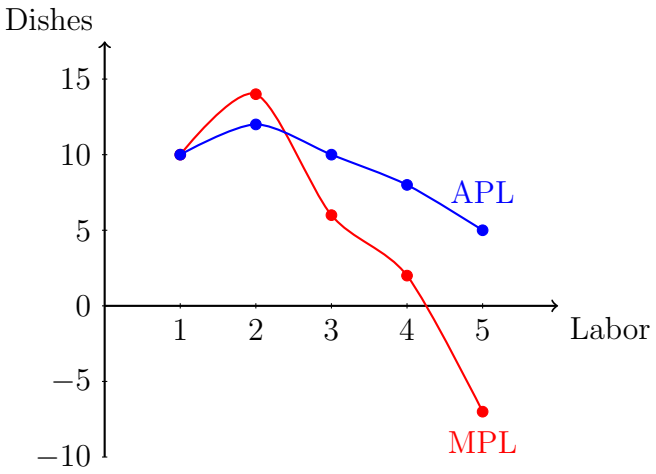

Figure 2: Graphing MPL and APL

It seems that MPL curve does not pass through the peak of APL. It is because this example has discrete labor. When labor is continuous, it will pass through the highest point.

Firm Choice of Technology

Exercise 3 Suppose Babcock Dairy Factory has the following three technologies available in producing banana milk. All three combine labor and capital price in fixed proportion as displayed in table 1.

Technology	Labor	Capital
A	4	3
B	2	5
C	4	4

Table 1: Input Requirement for Milk Per Gallon

(a) Is there a technology that will never be used?

Technology C will never be used. It is strictly inferior to technology A.

(b) If the unit price of labor is \$3, the unit price of capital is \$4, which technology would be used?

The factory uses the technology with the least cost per unit of output. The cost of producing one gallon of milk by technology A is $4 \times 3 + 3 \times 4 = 24$ while by technology B is $2 \times 3 + 5 \times 4 = 26$. Since $24 < 26$, technology A will be used.

(c) If the unit price of labor is \$4, the unit price of capital is \$2, which technology would be used?

The factory uses the technology with the least cost per unit of output. The cost of producing one gallon of milk by technology A is $4 \times 4 + 3 \times 2 = 22$ while by technology B is $2 \times 4 + 5 \times 2 = 18$. Since $22 > 18$, technology B will be used.