

Practice Set 3 – KEY

Cost, Supply & Competitive Markets

This set contains problems for your own practice. It is highly recommended to work on the problems on your own. Do not just read the provided solutions. Instead, try to solve the problems and use the solutions only when you cannot continue on your own. Reading problems that someone else has solved has the same value for your preparation like watching someone else running a marathon on TV and then expecting to be able to run it, too. If you have questions on this set, please ask your section's teaching assistant.

1. Fill in the following table:

q	TC	VC	FC	MC
0	—	—	60	-
1	—	10	—	—
2	90	—	—	—
3	—	—	—	20
4	—	80	—	—
5	180	—	—	—
6	—	—	—	50

q	TC	VC	FC	MC
0	$60 + 0 = 60$	0	60	-
1	$60 + 10 = 70$	10	60	$70 - 60 = 10$
2	90	$90 - 60 = 30$	60	$90 - 70 = 20$
3	$90 + 20 = 110$	$110 - 60 = 50$	60	20
4	$80 + 60 = 140$	80	60	$140 - 110 = 30$
5	180	$180 - 60 = 120$	60	$180 - 140 = 40$
6	$180 + 50 = 230$	$230 - 60 = 170$	60	50

2. Klara is a tutor of Spanish charging 30 euros per hour for lessons. At this price, she can find plenty of customers. Recently, she also started an online store where she sells handmade necklaces. The market for necklaces is perfectly competitive and the price for a necklace is 20 euros. It takes Klara 10 minutes to make a necklace and the marginal cost of materials is given below.

Necklaces per day	1	2	3	4	5	6	7	8	9	10
MC of materials	20	10	3	1	2	4	7	11	18	28

Derive the optimal number of necklaces Klara should produce per day.

Her total marginal cost should also include her cost of labor on top of the cost of materials. Klara's hour of work costs 30 euros and she can make 6 necklaces in one hour. Thus, the cost of labor for one necklace is $30/6 = 5$ euros, no matter how many necklaces she makes. Thus, her MC is

Necklaces per day	1	2	3	4	5	6	7	8	9	10
MC of time	5	5	5	5	5	5	5	5	5	5
MC of materials	20	10	3	1	2	4	7	11	18	28
MC	25	15	8	6	7	9	12	16	23	33
C	25	40	48	54	61	70	82	98	121	154
R	20	40	60	80	100	120	140	160	180	200

Π -5 0 12 26 39 50 58 **62** 59 46.

Klara will maximize her profit when $p = MC$. Here, $MC = 20$ occurs somewhere between 8 and 9 necklaces. In order to verify which of the two quantities yield a higher profit we can calculate the profits. First, we can calculate total cost (C) by adding the MCs for every unit:

- Cost for 8 units = $25 + 15 + 8 + 6 + 7 + 9 + 12 + 16 = 98$ euros.

- Cost for 9 units = $98 + 23 = 121$ euros.

Then, we calculate the total revenue (R) for 8 and 9 units:

- Revenue for 8 units = $8 \cdot 20 = 160$ euros.

- Revenue for 9 units = $9 \cdot 20 = 180$ euros.

Finally, we can calculate profit (Π) for 8 and 9 units:

- Profit for 8 units: = $160 - 98 = 62$ euros.

- Profit for 9 units: = $180 - 121 = 59$ euros.

Maximum profit occurs at $q = 8$. If we notice carefully, maximum profit would never occur for a quantity where $MC > MR$ because the contribution of that unit to total profit will be equal to $MC - MR < 0$.

3. Bob bought his car for \$200k and drives for Grab full time. If he was not driving Grab, his next best alternative would be to work as a chauffeur for \$39k per year. If he had become a chauffeur, he would not need to own a vehicle, so he could have left the \$200k in the bank and earn \$3k annual interest.

- (a) If Bob had chosen to work as a chauffeur, and thus not own a vehicle, would he be \$200k wealthier?

No. Bob would have the same net worth. As a chauffeur he would have \$200k in cash. As a Grab driver he would have a \$200k car. The nature of the asset is different (cash vs. vehicle) but the value is the same.

- (b) How much should Bob earn per year from Grab in order to say that he makes "zero economic profit"?

Bob would make zero economic profit if he earned just enough to cover his opportunity cost. Thus, if Bob earned from Grab \$39k to cover the cost of his own labor, plus \$3k to cover the cost of his capital (the cost of using the \$200k), he would be making zero profit. That is, zero profit for Bob is when he earns exactly \$42k.

- (c) If Bob was making zero profit, would he stay or exit the business of driving for Grab?

He would stay because he could not do better by exiting. He would make \$42k, as much as at his next best alternative (being a chauffeur).

- (d) What is the difference between making "zero accounting profit" and making "zero economic profit"?

Zero economic profit means that you earn as much as in your next best alternative. Zero accounting profit means that you bring home nothing. Thus, economic profit is what you make above and beyond your next best alternative.

- (e) What would it mean if Bob was making economic profit equal to \$20k?

It would mean that Bob earned \$20k more than in his next best alternative. In other words, that Bob earned a total of \$62k.

- (f) What would it mean if this year Bob earned \$35k?

It would mean that he made \$7k less than in his next best alternative. That is, he has economic losses of \$7k (economic profit = -\$7k). Bob still earned money from working Grab (\$35k) but not enough to cover his opportunity salary (\$39k) and his opportunity return of investment (\$3k).

- (g) Which definition of profit -accounting or economic- is more appropriate when taking decisions?

Economic profit is more appropriate for decision making because it accounts for all costs (explicit or opportunity) involved in every alternative. Accounting profit is more appropriate for calculating the financial performance of an action ignoring the existence of alternatives. Here, Bob will use economic

profit to decide if he will drive for Uber or become a chauffeur but accounting profit to calculate how much money he brings home every year.

4. Explain why a PC firm will not shut down in the S-R when $AVC < p < AC$.

When $p < AC$, the firm makes losses. However, when $AVC < p < AC$, the firm still covers all variable costs plus some part of the fixed costs for which it is committed to pay even if it shuts down. If the firm shuts down, the owner must cover the entire FC from pocket. Therefore, it is better if the firm continues operation in the S-R. Once the S-R period expires and all costs become variable and avoidable, if $p < LAC$, the firm will shut down.

5. Which of the following formulas would yield the profit of a firm?

$$(1) \Pi = R - C, \quad (2) \Pi = (p - AC)q, \quad (3) \Pi = (p - AVC)q - FC.$$

All three formulas equivalently yield the profit of a firm. Formula (1) subtracts the cost (C) from the revenue (R), which is the definition of profit. Formula (2) multiplies the profit per unit ($p - AC$) with the number of units q . Equation (3) does the same with (2) but subtracts the FC in the end. All 3 formulas are equivalent and you can use the one most convenient for the info you have available.

6. Explain why when MC is constant, then $AVC = MC$.

A constant MC suggests that each next unit costs as much as every previous. If all units cost the same, the average cost of variable resources (AVC) must also be the same. For instance, if every next unit costs 10 dollars to make, then all units cost 10 dollars each to make; thus, the average cost of variable resources (AVC) will also be 10 dollars. Hence, when MC is constant, $AVC = MC$. Moreover, if there are no fixed costs, $AVC = AC$. Consequently, when MC is constant and $FC = 0$, $AC = AVC = MC$. This is a very useful property in problems, because it may help us figure out AC or AVC when only the MC is given.

You are kindly requested to report any typos, mistakes or proposals for the improvement of this practice set key at kmarinakis@smu.edu.sg.