

3. Consider total cost and total revenue given in the following table:

Quantity	0	1	2	3	4	5	6	7
Total cost	\$8	9	10	11	13	19	27	37
Total revenue	\$0	8	16	24	32	40	48	56

- Calculate profit for each quantity. How much should the firm produce to maximize profit?
- Calculate marginal revenue and marginal cost for each quantity. Graph them. (Hint: Put the points between whole numbers. For example, the marginal cost between 2 and 3 should be graphed at $2\frac{1}{2}$.) At what quantity do these curves cross? How does this relate to your answer to part (a)?
- Can you tell whether this firm is in a competitive industry? If so, can you tell whether the industry is in a long-run equilibrium?

a) From $\text{Total Profit} = \text{Total Revenue} - \text{Total Cost}$

Quantity	0	1	2	3	4	5	6	7
Total cost	\$8	9	10	11	13	19	27	37
Total revenue	\$0	8	16	24	32	40	48	56
Total Profit	-8	-1	6	13	19	21	21	19

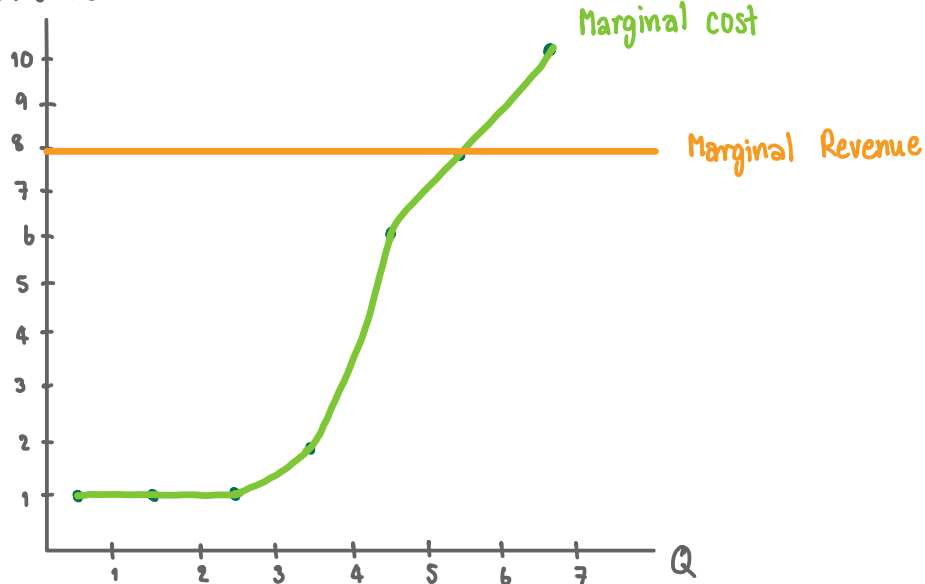
$\therefore$ To maximize the profit, the firm should produce 5 or 6 units because the profit equals to 21, the highest profit that the firm could earn according to this table. ~~XX~~

b)

Quantity	0	1	2	3	4	5	6	7
Total cost	\$8	9	10	11	13	19	27	37
Total revenue	\$0	8	16	24	32	40	48	56

Given : $\text{---} = \text{marginal cost}$
 $\text{---} = \text{marginal revenue}$

Revenue & Cost



∴ According to the graph, Marginal cost and marginal revenue cross at a quantity between 5 and 6 units. It does relate to the answer in part (a) that the profit is maximized when marginal cost equals to marginal revenue. ✖

d) This firm is in a competitive industry since the marginal revenue is the same for each quantity. However, the industry is not in a long-run equilibrium because profit is positive. ✖

7. A profit-maximizing firm in a competitive market is currently producing 100 units of output. It has average revenue ^{AR} of \$10, average total cost of \$8, and fixed cost of \$200.

- What is its profit?
- What is its marginal cost?
- What is its average variable cost?
- Is the efficient scale of the firm more than, less than, or exactly 100 units?

i.e. Is AC at its minimum?

a) $\text{Profit} = \text{Total Revenue} - \text{Total Cost}$

• Find TR from AR ; $AR = \frac{TR}{Q}$

$$10 = \frac{TR}{100} \rightarrow \therefore TR = 10(100) = \$1,000$$

• Find TC from ATC ; $ATC = \frac{TC}{Q}$

$$8 = \frac{TC}{100} \rightarrow \therefore TC = 8(100) = \$800$$

$$\therefore \text{Profit} = TR - TC = 1000 - 800 = \$200 \quad \text{✖}$$

b) Marginal cost = Marginal Revenue (the profit is maximized)

And Marginal revenue = Average revenue in a competitive market

$$\therefore \text{Marginal cost} = \text{Average revenue} = \$10 \quad \text{✖}$$

c) $\text{Average variable cost} = \text{Average total cost} - \text{Average Fixed cost}$

• Find ATC from TC ; $ATC = \frac{TC}{Q}$

$$ATC = \frac{800}{100} = \$8$$

• Find AFC from FC ; $AFC = \frac{FC}{Q} = \frac{200}{100} = \2

$$\therefore \text{Average variable cost} = \$8 - \$2 = \$6$$

d) Efficient scale of production occurs when $AC = MC$. Whereas, MC is \$10 and AC is \$8, from previous calculation. So, the efficient scale of the firm is less than 100 units.