Chp.5 Consumer choice and economic behavior.

What is marginal product?

- ***Marginal product*** is the additional output that will be forthcoming from an additional worker, other inputs remaining constant.

What is Average product?

- ***Average product*** is calculated by dividing total output by the quantity of the output.

A Production Table

Number of workers	Total output	Marginal product	Average product	
0	0		—	Increasing marginal returns
		4		
1	4		4	
		6		
2	10		5	
		7		
3	17		5.7	Diminishing marginal returns
		6		
4	23		5.8	
		5		
5	28		5.6	
		3		
6	31		5.2	
		1		
7	32		4.6	
		0		
8	32		4.0	Diminishing absolute returns
		2		
9	30		3.3	
		5		
10	25		2.5	

The Law of Diminishing Marginal Productivity

- The law of diminishing marginal productivity is an important element in all real-world production processes.
- Both marginal and average productivities initially increase, but eventually they both decrease.

The Law of Diminishing Marginal Productivity

- This means that initially the production function exhibits increasing marginal productivity.
  - Then it exhibits diminishing marginal productivity.
  - Finally, it exhibits negative marginal productivity.

The Law of Diminishing Marginal Productivity

- The most relevant part of the production function is that part exhibiting diminishing marginal productivity.

The Law of Diminishing Marginal Productivity

- The ***law of diminishing marginal productivity*** states that as more and more of a variable input is added to an existing fixed input, after some point the additional output one gets from the additional variable input will fall.

The Law of Diminishing Marginal Productivity

- This law is true since, as a firm adds more and more workers, they must share the existing machines, so the marginal product of the machines increases while the marginal product of the workers decreases.

The Costs of Production

- There are many different types of costs.
- Invariably, firms believe costs are too high and try to lower them.

Costs of Production

- Fixed Costs,
- Variable Costs, and
- Total Costs

Fixed Costs, Variable Costs, and Total Costs

- ***Fixed costs*** are those that are spent and cannot be changed in the period of time under consideration.
- In the long run there are no fixed costs since all costs are variable.
- In the short run, a number of costs will be fixed.

Fixed Costs, Variable Costs, and Total Costs

- Workers represent ***variable costs*** – those that change as output changes.

Fixed Costs, Variable Costs, and Total Costs

- The sum of the variable and fixed costs are total costs.

$$TC = FC + VC$$

Costs of Production: Average Costs

- Average Total Cost, Average Fixed Cost, and Average Variable Cost
- Average costs are *costs per unit of output*

Average Costs

- Much of the firm's discussion is of average cost.

Average Costs

- ***Average total cost*** (often called average cost) equals total cost divided by the quantity produced.

$$ATC = TC/Q$$

Average Costs

- ***Average fixed cost*** equals fixed cost divided by quantity produced.

$$AFC = FC/Q$$

Average Costs

- ***Average variable cost*** equals variable cost divided by quantity produced.

$$AVC = VC/Q$$

Average Costs

- Average total cost can also be thought of as the sum of average fixed cost and average variable cost.

$$ATC = AFC + AVC$$

The Cost of Producing Earrings							
Output	FC	VC	TC	MC	AFC	AVC	ATC
3	50	38	88	—	16.67	12.66	29.33
4	50	50	100	12	12.50	12.50	25.00
9	50	100	150	—	5.56	11.11	16.67
10	50	108	158	8	5.00	10.80	15.80
16	50	150	200	—	3.13	9.38	12.50
17	50	157	207	7	2.94	9.24	12.18
22	50	200	250	—	2.27	9.09	11.36
23	50	210	260	10	2.17	9.13	11.30
27	50	255	305	—	1.85	9.44	11.30
28	50	270	320	15	1.79	9.64	11.42

Thanks