HW#10 Due November 10, 2020

4. Nimbus, Inc., makes brooms and then sells them door-to-door. Here is the relationship between the number of workers and Nimbus's output during a given day:

Workers	Output	Marginal Product	Total Cost	Average Total Cost	Marginal Cost
0	0		200	-	
		20			5
1	20		300	15	
		30			3.3
2	50		400	8	
		40			2.5
3	90		500	3.3	
		30			3.3
4	120		600	5	
		20			5
5	140		700	5	
		10			10
6	150		800	5.3	
		5			20
7	155		900	5.8	

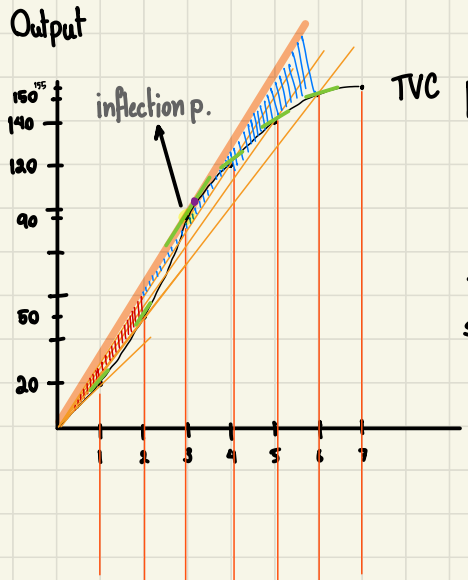
a. Fill in the column of marginal products. What pattern do you see? How might you explain it?

b. A worker costs \$100 a day, and the firm has fixed costs of \$200. Use this information to fill in the column for total cost.

c. Fill in the column for average total cost. (Recall that $ATC = TC/Q$.) What pattern do you see?

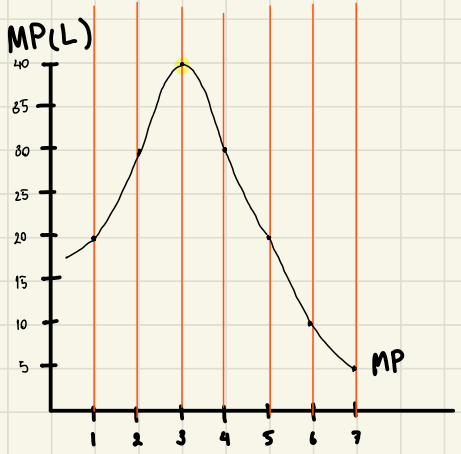
d. Now fill in the column for marginal cost. (Recall that $MC = \Delta TC/\Delta Q$.) What pattern do you see?

a.)



the marginal product is the quantity changed by increasing one more unit of worker.

As the plotted graph below, the highest MP is at the 3 workers. It is the point that the line tangented to the TP at 3 workers has steepest slope.



constant

$TC = TFC + TVC$

$\frac{TC}{Q} = \frac{TFC}{Q} + \frac{TVC}{Q}$ $\quad \frac{d}{dQ}TC(Q) = \frac{d}{dQ}TFC + \frac{d}{dQ}TVC$

$AC = AFC + AVC$ $\quad \therefore \quad MC(Q) = MVC(Q)$

b.) a worker cost 100 $ a day
fixed cost at 200 $

SHORT-RUN

$TC(L) = TFC(L) + TVC(L)$

$TC(L) = 200 + TVC$

1L.	300	= 200 +	100(1)
2L.	400	= 200 +	100(2)
3L.	500	= 200 +	100(3)
4L.	600	= 200 +	100(4)
5L.	700	= 200 +	100(5)
6L.	800	= 200 +	100(6)
7L	900	= 200 +	100(7)

c.) Find ATC

$ATC = AFC + AVC$

$ATC = \frac{TC}{Q}$

1L. $ATC = \frac{300}{20} = 15$

2L. $ATC = \frac{400}{50} = 8$

3L. $ATC = \frac{500}{90} = 5.5$

4L. $ATC = \frac{600}{130} = 5$

5L. $ATC = \frac{700}{140} = 5$

6L. $ATC = \frac{800}{150} = 5.3$

7L. $ATC = \frac{900}{155} = 5.8$

d.) Find MC

$MC = \frac{\Delta TC}{\Delta Q}$

$L_{0\to1}$ $MC = \frac{300-200}{20-0} = 5$

$L_{1\to2}$ $MC = \frac{100}{30} = 3.33$

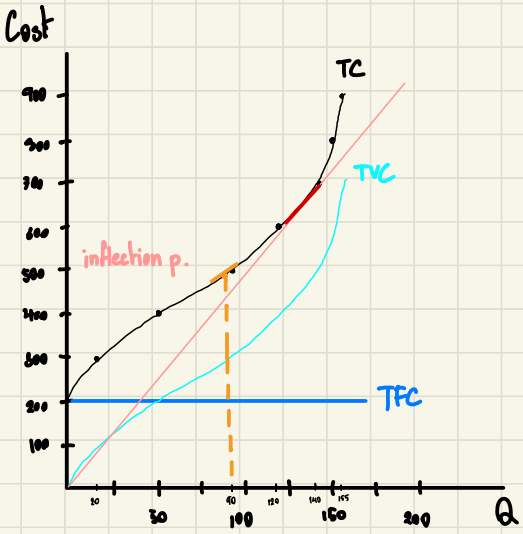
$L_{2\to3}$ $MC = \frac{100}{40} = 2.5$

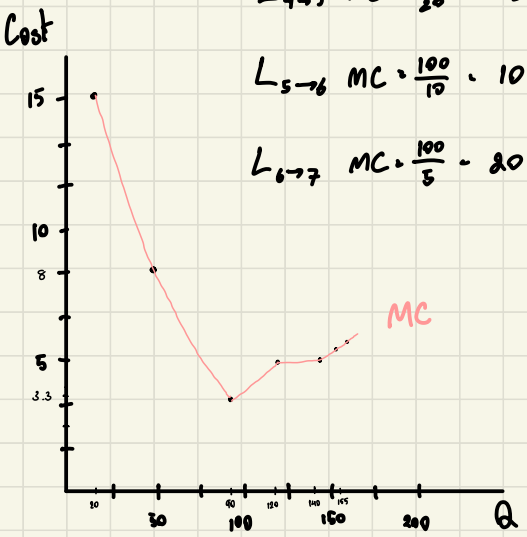
$L_{3\to4}$ $MC = \frac{100}{30} = 3.33$

$L_{4\to5}$ $MC = \frac{100}{20} = 5$

$L_{5\to6}$ $MC = \frac{100}{10} = 10$

$L_{6\to7}$ $MC = \frac{100}{5} = 20$





5. You are the chief financial officer for a firm that sells gaming consoles. Your firm has the following average-total-cost schedule:

ATC

Quantity	Average Total Cost
600 consoles	$300
601	301

Your current level of production is 600 consoles, all of which have been sold. Someone calls, desperate to buy one of your consoles. The caller offers you $550 for it. Should you accept the offer? Why or why not?

Total Cost

$600 \times 300 = 180{,}000$

$601 \times 301 = 180{,}901$

Cost of producing 1 more unit is 901 $ which is a lot higher than the money we will receive, which is 550$.

∴ A producer must not accept the offer of $550 from the buyer.