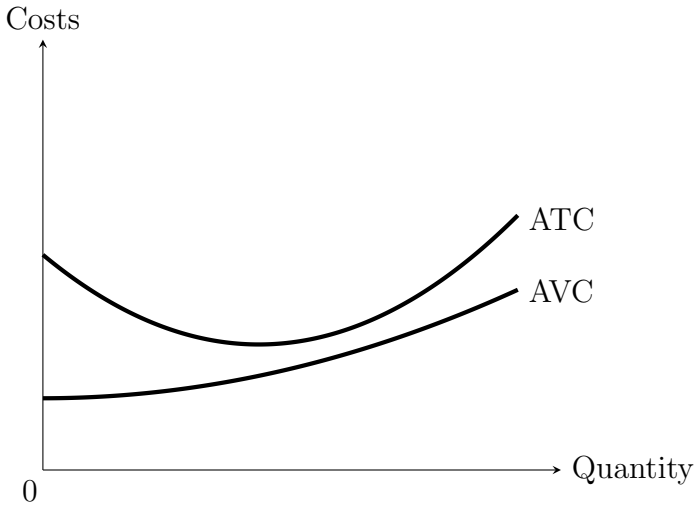
Practice Problem Set 9

180.102 Elements of Microeconomics - TA Section 03

Pinda Wang, 25 October 2024

1. Indicate whether the following statements are true or false, and justify your answer.
   (a) When MC<AVC, AVC decreases with quantity.
   (b) When MC is decreasing with quantity, ATC must also be decreasing.
   (c) When ATC is decreasing with quantity, MC must also be decreasing.

2. Look at the following graph of the ATC and AVC of a firm. What is "atypical" (but not wrong) in this graph? What is wrong in this graph?



3. Fill in the following table.

Quantity	FC	VC	TC	MC	ATC	AVC
0				-	-	-
1				16		
2		28				
3			72			
4					19	
5				8		9.6
6					16	
7						
8				20		12

Solutions to Practice Problem Set 9

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1. (a) True. When MC<AVC, the cost of an additional unit of product is smaller than the average variable cost. As a result, AVC decrease with quantity.

   (b) True. AVC $= \frac{\text{VC}(q)}{q} = \frac{\sum_{i=1}^{q} \text{MC}(i)}{q}$. Notice that if $MC(1) > MC(2) > ... > MC(q)$, then $AVC(1) > AVC(2) > ... > AVC(q)$. A typical MC curve is first decreasing and then increasing. Therefore, at the decreasing part of the MC curve, the above analysis holds, and AVC is decreasing with quantity.

   (c) False. For ATC to decrease with quantity, it only requires that MC<ATC. It doesn't require MC to be decreasing.

2. **Atypical:** The firm's AVC is increasing with quantity, whereas a typical AVC is U-shaped.

   Wrong: In this graph, when Q is large, $ATC - AVC$ is increasing. This is wrong because $ATC - AVC = AFC$, and AFC should always be decreasing with quantity.

3. See table below.

Quantity	FC	VC	TC	MC	ATC	AVC
0	36	0	36	-	-	-
1	36	16	52	16	52	16
2	36	28	64	12	32	14
3	36	36	72	8	24	12
4	36	40	76	4	19	10
5	36	48	84	8	16.8	9.6
6	36	60	96	12	16	10
7	36	76	112	16	16	10.86
8	36	96	132	20	16.5	12