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ECON 202—Montgomery College

LECTURE 21: COMPETITION II

I. Recall last class:

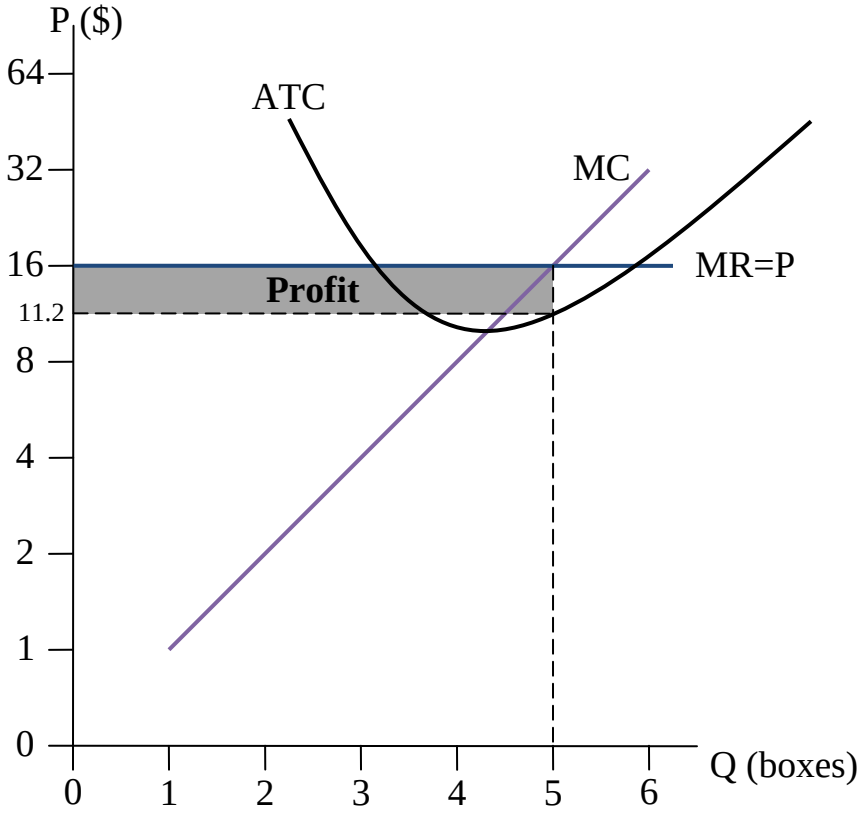
Output	*TFC*	*TVC*	*TC*	*MC*
0	25	0	**25**	
1	25	1	**26**	**1**
2	25	3	**28**	**2**
3	25	7	**32**	**4**
4	25	15	**40**	**8**
5	25	31	**56**	**16**
6	25	63	**88**	**32**

Output	*ΔΠ*	*Π*	*TR*	*TC*	*ATC*	*MC*	*MR*
0		**-25**	**0**	**25**			
1	**15**	**-10**	**16**	**26**	**26**	**1**	16
2	**14**	**4**	**32**	**28**	**14**	**2**	16
3	**12**	**16**	**48**	**32**	**10.67**	**4**	16
4	**8**	**24**	**64**	**40**	**10**	**8**	16
5	**0**	**24**	**80**	**56**	**11.20**	**16**	16
6	**-16**	**8**	**96**	**88**	**14.67**	**32**	16

a. Note that price is constant, marginal cost is increasing, and average total cost has a U-shape.
   i. One rule that bears mentioning—but hard numbers make it hard to capture due to their lumpiness—is that the marginal cost curve *always* intersects the average total cost curve at its lowest point.
   ii. If an additional unit costs less than the average unit costs, producing that unit should lower ATC.
   iii. If an additional unit costs more than the average unit costs, producing that unit should increase ATC.
   iv. If an additional unit costs the same as the average unit costs, producing that unit should not change ATC.[1]

[1] If you're curious about the mathematical proof for this rule, let me know and I'll happily walk you through it. But it requires calculus so I leave it out in the notes to avoid confusion.

b. Let's aggregate this information into a diagram using these relationships (note the logarithmic scale).



c. The process for solving this diagram is always the same:
   i. Find the quantity where MC = MR.
   ii. At that quantity, how much does each unit sell for (here it's the constant, MR=P)?
   iii. At that quantity, how much does each unit cost to make (by referencing the ATC curve)?
   iv. The difference between the price and the cost-per-unit is the profit-per-unit.
   v. Multiplying the profit-per-unit the number of units (quantity) gives you the total profit.

II. Proof

a. $\Pi = TR - TC = PQ - TC$

b. $\Pi = 1(PQ - TC) = \frac{Q}{Q}(PQ - TC) = Q\frac{1}{Q}(PQ - TC)$

c. $\Pi = Q\left(\frac{PQ}{Q} - \frac{TC}{Q}\right) = Q\left(P - \frac{TC}{Q}\right) = Q(P - ATC)$