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Part 2: Cost Curves

In part 2 of this 2-part handout, we will look at cost curves. We'll focus on the main cost curves, total cost, average cost and marginal cost.

As we consider the cost associated with producing output, note that when we discuss cost within the context of firms, we are discussing economic cost, rather than accounting cost. If we consider the cost of all factors, both variable and fixed factors, we get the overall cost of producing a given amount of output that we call total cost (TC).

We begin this discussion with a total cost curve equation. Let's assume that the total cost of producing varying amounts of output of some good is given by the following equation below:

$$TC = 2Q^3 - 18Q^2 + 60Q + 50.$$

If we plug different values of output (Q) into the equation above, we get different values of total cost. E.g., if $Q = 1$, then $TC = 2(1)^3 - 18(1)^2 + 60(1) + 50$, which tells us that $TC = 94$.

Table 2 shows us the total cost associated with each different output level from column 1. Note, of course, that higher output always leads to greater total cost.

Given the total cost equation above, we can derive different values of average cost. Average cost is total cost per unit of output. I.e., $AC = \frac{TC}{Q}$.

That is, if we divide every value in the total cost column by its corresponding value of output (Q), we get the AC values in column 3. E.g., if we divide the value for TC in row 1 by the output from row 1 ($TC = 94$ and $Q = 1$), then we get $AC = 94.0$.

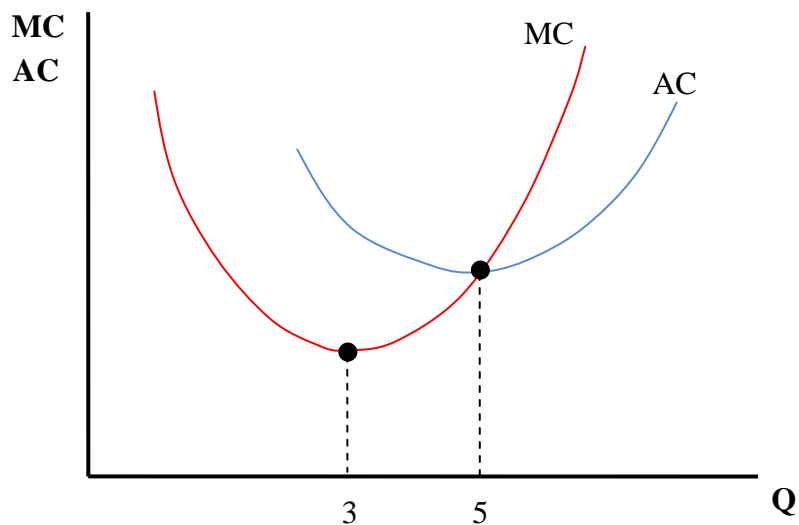
Lastly, we want to calculate values for marginal cost (MC). One way to do this would be to look at the differences in TC and Q between each row, but that's not the method we'll use in this section. Here, we will simply provide an equation for MC. The MC equation that accompanies the total cost equation above is as follows: $MC = 6Q^2 - 36Q + 60$. Column 4 of our table is derived by plugging values for Q into this MC equation.

Table 2

Q	TC	AC	MC
1	94	94.0	30.0
2	114	57.0	12.0
3	122	40.7	6.0
4	130	32.5	12.0
5	150	30.0	30.0
6	194	32.3	60.0
7	274	39.1	102.0
8	402	50.3	156.0
9	590	65.6	222.0
10	850	85.0	300.0
11	1194	108.5	390.0
12	1634	136.2	492.0
13	2182	167.8	606.0
14	2850	203.6	732.0
15	3650	243.3	870.0
16	4594	287.1	1020.0
17	5694	334.9	1182.0
18	6962	386.8	1356.0
19	8410	442.6	1542.0
20	10050	502.5	1740.0
21	11894	566.4	1950.0
22	13954	634.3	2172.0
23	16242	706.2	2406.0
24	18770	782.1	2652.0
25	21550	862.0	2910.0
26	24594	945.9	3180.0
27	27914	1033.9	3462.0
28	31522	1125.8	3756.0
29	35430	1221.7	4062.0
30	39650	1321.7	4380.0

Now that we've calculated different values for AC and MC, let's consider what these values would look like on a graph. First, note that AC decreases, and then increases. This tells us that AC is a u-shaped curve. A similar pattern with MC appears as well, which of course means that MC is also a u-shaped curve. Note that when $Q = 5$, we see two things: (a) that AC is at a minimum point, and (b) that $AC = MC$, which means that they intersect where $Q = 5$.

Taking the appropriate information from Table 2, we will now draw the graph of the AC and MC curves. That graph is presented below..



As discussed above, the AC curve reaches a minimum point where $Q = 5$. The minimum point on the MC curve occurs when $Q = 3$.