Homework Exercises 4: Production and Cost

1a.

Number of Accountants	Marginal Product
0	0
1	5
2	7
3	5
4	3
5	2

1b. Increasing marginal returns to labor are evident for the range between 0 and 2 accountants. Diminishing marginal returns then set in for each remaining accountant.

1c. The crucial assumption here is that the quantity of other inputs (equipment) remain fixed. Hence, additional accountants might not have ready access to computer equipment, printers, or even desk space. This would decrease the amount of services that each additional accountant could produce.

q	***K***	***L***	***TFC***	***TVC***	***TC***	***MC***	***AFC***	***AVC***	***ATC***
0	1	0	150	0	150				
30	1	1	150	100	250	3.33	5	3.33	8.33
70	1	2	150	200	350	2.5	2.14	2.86	5
120	1	3	150	300	450	2	1.25	2.5	3.75
160	1	4	150	400	550	2.5	0.93	2.5	3.44
190	1	5	150	500	650	3.33	0.79	2.63	3.42
210	1	6	150	600	750	5	0.71	2.86	3.57

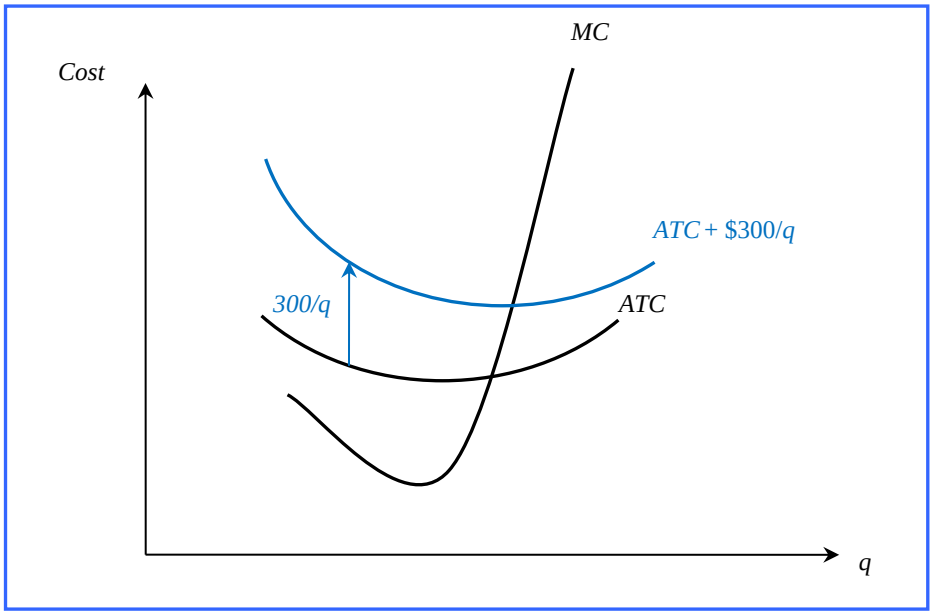
2a. Clean n' Shine experiences increasing marginal returns to labor over the range of 0-120 units of output. It experiences decreasing marginal returns to labor at all output levels beyond 120.

2b. Yes. Average fixed cost falls as output rises.

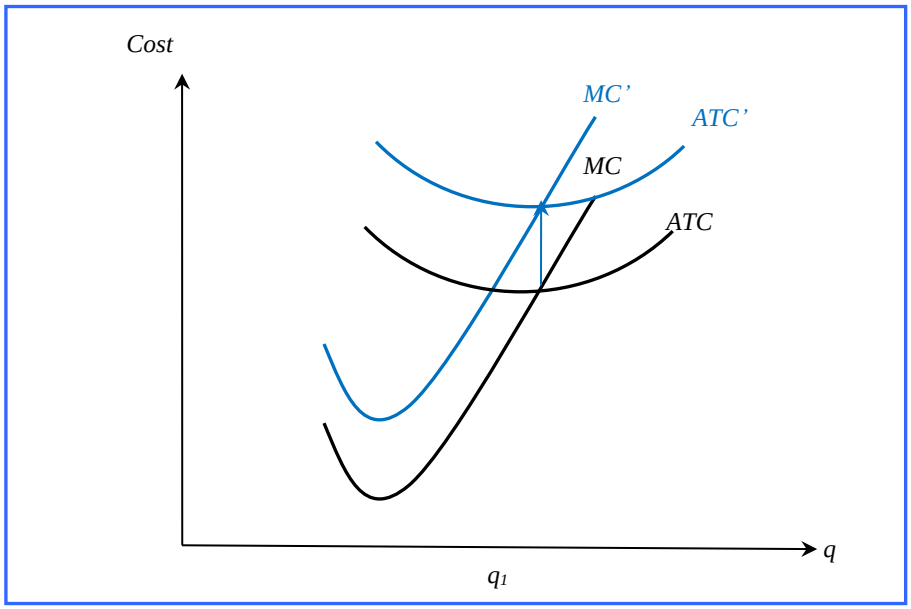
2c. Yes. First, they all fall as output rises, then begin to rise as output continues to rise.

2d. Yes. *AVC* and *ATC* both fall until they intersect *MC*, and then the rising marginal costs pull them up.

3a. The increase in a lump sum advertising cost by \$300 will increase the fixed cost of the firm. Therefore, the average total cost will shift upward, while the average variable cost and marginal cost curves will remain unchanged. Note that the *ATC* will shift up by \$300/*q* at each unit, so it shifts by smaller amount as *q* increases.



3b. The increase in the input prices of burger meat will increase the variable cost of the firm. Therefore, all the average total cost, the average variable cost and marginal cost curves will shift up.



4. Machines needed for newer chips are very expensive and indivisible inputs, i.e. you must buy the whole machine, even if production is small. It usually results in economies of scale over a large range of output. It implies that a firm's long-run average costs will fall as the firm increases output. In order to enjoy the benefit of economies of scale, computer chipmakers tend to build bigger fabs, which allows them to be able to increase the output of computer chips. The more chips these firms are able to produce in each factory, the lower the cost per chip.

5a. *Point C*. In the short run, Ludmilla cannot adjust all her inputs to achieve the lowest cost input mix. She will move along her short-run *ATC* curve, marked *ATC*1 in the diagram.

5b. Eventually, she wants to be at *point B*. She can get there by adjusting all of her inputs over the long run, to produce 20 units at the lowest possible cost.

5c. At 70 schnitzels per day, the firm is operating at *point H*. Cutting back production to 20 units the way Hans wants to do it (reducing variable inputs only) would move the firm leftward along *ATC*3, substantially raising average cost in the short run. This would *not* return the firm back to its initial lower-output situation at *point B*. Ludmilla's method of scaling back *all* inputs would move the firm along its *LRATC* curve, permitting a return to *point B*. If the goal is to return to 20 units, Ludmilla's way will result in lower cost (hence higher profit) in the long run.

6. Making only a small number of phones means the company has to spread its costs of indivisible inputs (R&D, machinery, etc) over only a small amount of output. It implies that they fail to enjoy the cost advantage of economies of scale. If they sold more phones (= higher volume), costs would be spread out, and average cost per phone would drop (economies of scale). The volume of mobile phones being produced by the Japanese manufacturers is low, resulting in higher average costs, so they cannot lower the prices.