

Homework #5

Note: Make sure to do these without a calculator. (You can't use one on the exam.)

- 1.) Let $TC = 300 + 100Q - 12Q^2 + Q^3$.
 - a.) Identify the fixed and variable costs in the above equation.
 - b.) From the above equation, find the equations for AFC, AVC, ATC and MC—in general and then, for $Q = 10$. (For MC, remember the following derivatives: $d(c)/dX = 0$, $d(cX)/dX = c$, $d(cX^2)/dX = 2cX$, and $d(cX^3)/dX = 3cX^2$.)
 - c.) Draw the MC, AVC and ATC curves in general (p. 291's Fig. 8.2 except for AFC). On the graph, note Q' where $AVC = MC$ and Q'' where MC is minimized.
 - d.) Calculate Q' and Q'' for the above equation.
 - Hint for Q' : what is happening between AVC and MC at Q' and/or what is the slope of AVC at Q' ? (Thus, there are two ways to make this calculation.)
 - Hint for Q'' : what is the slope of MC at Q'' ?
 - e.) Calculate AVC and MC for Q' and Q'' and add it to your graph.

- 2.) If the marginal product of the variable input declines from the very start, what will the short-run marginal, average variable, and average total cost curves look like?

- 3.) Reproduce the table or fill in the blanks for A – Y in this table:

Q	FC	VC	TC	MC	AFC	AVC	ATC
1	\$100	\$50	A	\$50	--	--	--
2	B	C	D	\$30	E	F	G
3	H	I	J	K	L	\$40	M
4	N	O	\$270	P	Q	R	S
5	T	U	V	W	X	Y	\$70