Problem Sets 8

1. Given a firm's marginal cost function, derive its total cost and average cost functions. (in $)
   1) MC=2, what are the AC and TC at Q=10? Draw the three cost functions in graph(s).
   2) MC=2Q, what are the AC and TC at Q=5? Draw the three cost functions in graph(s).
   3) MC=$(Q-2)^2+2$, what are the TC and AC when Q=1 and Q=3. Draw them in graph(s).

2. Given the total cost function $TC = Q^3/3 - 3Q^2 + 20Q$ and marginal cost $MC = Q^2 - 6Q + 20$; derive average cost function AC. Show TC, AC and MC in two separate graphs. [Extra: 0.2 pts]

3. The demand schedule facing a firm is shown below.

Price	Quantity	TR	MR	AR
$20	2	40		20
$19	3	57	+17	19
$18	4	72	+15	18
$17	5			
$16	6			
$15	7			
$14	8			
$13	9			
$12	10			
$11	11			
$10	12			

   1) Complete the total revenue, marginal revenue, and average revenue data in the table.
   2) What happen to the difference between selling price and marginal revenue as Q rises?
   3) How many units would the firm sell if the average cost is $8 per unit output and if the firm aims to maximize its economic profit (revenue minus costs)? What price would the firm charge?
   4) Can the firm charge $18? What is the corresponding economic profit?
   5) What is the economic profit of when the firm charges $14?

4. If the direct production cost per unit (average cost) is $1 and the market demand facing the firm is P=10-2Q, derive an expression for economic profit in terms of Q. No calculus required.
   1) Sketch a graph of economic profit against Q.
   2) For what values of Q would the firm break even?
   3) What are the optimal output and price to maximum profit?

5. Biwei's Barbershop is a business in a perfectly competitive market with total cost of $TC = 0.5Q^2$ per day. The corresponding marginal cost is $MC=Q$. Assume that the market price of a haircut is $15. How many haircuts should Biwei supply each day for profit maximization? What is the max profit?