

### Econ 302: Assignment 1

Instructor: Huan Xie, Concordia University  
due 4:00pm January 28, 2016, put in my mailbox

*Provide complete work that leads to each answer. Do the problems in the order given.*

1. (25 points) A competitive firm has a cost function given by  $C(y) = 10y - 2y^2 + \frac{1}{3}y^3$ .
  - a. Derive the  $SAC$ ,  $SMC$  and  $AVC$  functions and show them on a graph. What is the short run supply function? Show this function on your graph.
  - b. Assume that the market price is  $p = 15$ . Show on a graph the producer's surplus using the three alternative methods covered in class. Use one of these methods to calculate the producer's surplus.
2. (25 points) A competitive firm has an  $AVC = y + 3$ , and a fixed cost equal to 9.
  - a. Derive the firm's cost function  $C(y)$ , marginal cost function  $SMC(y)$  and average cost  $SAC(y)$ . Show  $AVC$ ,  $SMC$  and  $SAC$  on a graph.
  - b. Suppose the market price is 15. How many units would the firm produce? Determine the associated profit and producer surplus for the firm. Explain any difference.
3. (25 points) Consider two firms out of a competitive industry. They have the following technologies:  $C_1(y) = y^2 + 2y$ ;  $C_2(y) = 1.5y^2 + 3y$ . Show these firms' individual supply functions on a clearly-labelled graph. Construct an aggregate supply function for these two firms on your graph.
4. (25 points) Consider three firms out of a competitive industry. They have the following technologies:  $C_1 = y^2 + 9$ ;  $C_2 = y^2 + y + 9$ ;  $C_3 = y^2 + 2y + 9$ .
  - a. For each firm derive the  $SAC$ ,  $SMC$  and  $AVC$ . Show these curves on three graphs, one for each firm.
  - b. Suppose that in the short run the market price is 7. Show each firm's profit on your graphs. Should all of these firms produce? Explain.