Due Date: Monday, November 18

Be sure to show all of your work and clearly indicate your final response to each question. For exercises from the workbook you can hand in the completed workbook pages or provide the answers on separate sheets of paper. Please be sure that your homework is stapled before handing it in.

1. There are 1000 identical firms producing a good $X$, and the total cost curve for each firm is given by

$$TC(q) = q^2 + wq,$$

where $q$ is the firm’s output level and $w$ is the wage rate of labor in the industry.

(a) If $w = 10$, what will be the firm’s (short-run) supply curve? How many units of $X$ will be produced when the price of $X$ is 20 per unit? How many more units of $X$ would be produced if the price moved to 21?

(b) Suppose that the wages of labor in the industry depend on the number of units of $X$ produced, and that the form of this relationship is given by $w = .002Q$, where $Q$ represents total industry output, which is 1000 times that of a typical firm. In this situation, show that the firm’s marginal cost (and short-run supply) depends on $Q$. What is the industry supply curve? How much $X$ will be produced at a price of 20? How much will be produced at a price of 21? What do you conclude about the shape of the short-run supply curve in this case?

2. Suppose that the demand for a good $Y$ is given by $Q_D = 100 - 2p$, and the supply (at the industry level) is given by $Q_S = 20 + 6p$, where $p$ is output price.

(a) What will be the equilibrium price and quantities for $Y$?

(b) Suppose the government levies a tax of $4 per unit of $Y$ [that is, the government deducts $4 from the price of every unit of $Y$ transferred from firms to consumers]. Now what will be the equilibrium quantity sold, the price consumers pay, and the price firms receive? How is the burden of the tax “shared” by buyers and sellers?

(c) How do your answers to the previous two parts change if the supply curve were instead $Q_S = 70 + p$? What do you conclude by comparing these two cases?
3. A market is inhabited by 72 consumers each with an income of 100. They also have the same utility function, given by

\[ U(x_1, x_2) = 0.25 \ln(x_1) + 0.75 \ln(x_2). \]

Any firm that produces the good \( x_1 \) has access to the following total cost function

\[ C(q) = 36 + 3q + q^2, \]

where \( q \) is the output level of the firm. Determine the long run equilibrium price of output and the number of firms that will be active in the industry.

4. WIM 22.2
5. WIM 22.11
6. WIM 23.4
7. WIM 23.7