

Practice Problem Set 1

Notes: *Please note that the questions are based on the material in Lectures 1-2. There are five questions in this practice problem set. You do not need to submit this problem set; this is only for your practice; the solutions to the problems will be posted on Canvas after the deadline for HW 1, i.e., Oct 2.*

Question 1: Suppose that the supply and demand functions for a good are

$$q^S(p) = bp - a \quad q^D(p) = c - dp,$$

where a, b, c, d are positive constants. Find the equilibrium price (p^*). Next, if an excise tax of T per unit is imposed ($T \neq 0$), find the resulting market price p^T and show that $p^T < p^* + T$.

Question 2: Let $Q = \{(x, y) | y = x^2 + 3x + 4\}$ and $L = \{(x, y) | y = x + 1\}$. Find $Q \cap L$.

Question 3: Find the solution of the recurrence equation

$$3y_t = 2y_{t-1} + 10$$

when $y_0 = 25$, and describe its behavior as $t \rightarrow \infty$. Find the condition (in terms of t) that needs to be satisfied to make y_t differ from the time-independent solution by less than 0.5.

Question 4: An amount of \$2000 is invested and attracts interest at a rate equivalent to 8% per annum. Find the total after 1 year if the interest is compounded (a) annually (once a year), (b) quarterly (every three months), and (c) daily. (Assume that the year is not a leap year.)

Question 5: Consider the cobweb model. Suppose the supply and demand equations are given by the equations $q = p - 2$ and $q = 7 - 2p$, respectively. Derive the recurrence equation, and suppose that $p_0 = 3.5$. Does the market approach the equilibrium price when $t \rightarrow \infty$?