1. Assume that a monopolist has $TC(Q) = 14Q$ and the market demand is $P(Q) = 50 - 1Q$.
   (a) What is the firm's marginal cost?
   (b) What is the profit-maximizing price and quantity (P^*, Q^*)?
   (c) What is the total revenue at (P^*, Q^*)?
   (d) What is the total cost at (P^*, Q^*)?
   (e) What is the profit at (P^*, Q^*)?
   (f) What is the consumer surplus at (P^*, Q^*)?
   (g) What is the deadweight loss at (P^*, Q^*)?

2. Assume that a monopolists sells a product in the short-run with a total cost function

$$STC(Q) = \begin{cases} 103 + 26Q + 1Q^2 & Q > 0 \\ 100 & Q = 0 \end{cases}$$

   The market demand curve is given by the equation $P(Q) = 50 - 2Q$.
   (a) Find the marginal cost for the firm.
   (b) Find the profit-maximizing output and price (P^*, Q^*).
   (c) What are the monopolists profits?
   (d) Does the monopolist want to stay in business?

3. Assume that a monopolist has $TC = 3 + 26Q + 1Q^2$ and the market demand is $P(Q) = 50 - 2Q$.
   (a) What is the profit-maximizing price and quantity (P^*, Q^*)?
   (b) What is the marginal cost at Q^*?
   (c) Calculate the price elasticity of demand at (P^*, Q^*) (use the equation for elasticity, not IEPR).
   (d) Verify that the IEPR holds.

4. Suppose that a monopolist faces $TC = 23 + 72Q$ and the market demand is $Q(P) = 100P^{-2}$
   (a) Find the marginal cost for the firm.
   (b) What is the price-elasticity of demand for the demand curve?
   (c) What price should the monopolist set in the market?
   (d) Would the monopolist have more or less freedom to raise the price if the demand were $Q(P) = 100P^{-4}$.

5. A monopolist faces a demand curve $P = 50 - 2Q$ and initially faces a constant marginal cost $MC = 18$.
   (a) Calculate the profit-maximizing monopoly quantity and price, and compute the monopolist's total revenue and profits at the optimal price.
   (b) Suppose that the monopolist's marginal cost increases to $MC = 26$. Verify that the monopolist's total revenue goes down.
   (c) Suppose that all firms in a perfectly competitive equilibrium had a constant marginal cost $MC = 18$. Find the long-run perfectly competitive industry price and quantity. Also what are the combined industry profits and revenue.
   (d) Suppose that all firms' marginal costs increased to $MC = 26$. Verify that the increase in marginal cost causes total industry revenue to go up.

6. Suppose a monopolist producing Q units of output faces the demand curve $P = 40 - Q$. Its total cost when producing Q units of output is $TC = F + 2Q^2$, where F is a fixed cost.
   (a) For what values of F can a profit-maximizing firm charging a uniform price earn at least zero economic profit?
   (b) For what values of F can a profit-maximizing firm engaging in perfect first-degree price discrimination earn at least zero economic profit?

7. A monopolist has $TC(Q) = 16 + 14Q$ faces customers that each have the demand $P(Q) = 50 - 1Q$. Calculate the consumer surplus that each customer receives and the profits that the firm earns from each customer when the firm uses:
   (a) the profit-maximizing uniform price.
   (b) a two-block tariff where they charge $P = 42$ in the first block, and whatever price leads to the highest profits in the second block. (Find the best price in the second block).
   (c) the profit-maximizing two-block tariff.

8. A seller produces output with a constant marginal cost $MC = 2$. Suppose there is one group of consumers with the demand curve $P_1 = 42 - 1Q_1$, and another with the demand curve $P_2 = 34 - 1Q_2$.
   (a) If the seller can discriminate between the two markets, what prices would she charge to each group of consumers?
   (b) If the seller cannot discriminate, but instead must charge a uniform price to consumers in both markets, what will be her profit-maximizing price?
   (c) Which, if any, consumer group benefits from price discrimination? (Compare consumer surplus of groups)
   (d) If instead $P_1 = 34 - 4Q_1$, does either group benefit from price discrimination?