

IO UV - Fall 2026
Exercise #2: Perfect Competition (09/24/2026)

Part I

Question #1

The market demand curve for a certain product is given by $Q(p) = 120 - p$, where p is the market price and Q denotes the quantity purchased by the consumers. Suppose that the product is produced with a single factor of production called labor, denoted by L . Assume that each firm i can hire any amount of labor at a fixed given wage rate, denoted by $w > 0$. The production function of each firm i is given by $q_i = (L_i)^{\frac{1}{2}}$, where L_i is the amount of labor employed by firm i .

- a. Suppose that there is only one firm producing this product; call it firm 1. Solve the firm's profit maximization problem and prove that the firm's supply curve is given by $q_1 = \frac{p}{2w}$.
- b. Suppose now that $w = 1$. Solve for the competitive equilibrium price and quantity for this single-firm industry.
- c. Calculate the profit of this firm in a competitive equilibrium
- d. Now suppose that there are two firms, whose output levels are denoted by q_1 and q_1 . Solve the competitive equilibrium price and quantities produced by each firm