Exercise 1 [30]: Suppose a production function is given by \( f(L, K) = KL^{\frac{1}{3}} \), and that the price of capital is $10 and the price of labor is $16. Imagine that the capital is fixed at the level \( K = 4 \). (Short Run)

1. What is the quantity of labor that minimizes the cost of producing any given input?
2. What is the minimum cost of producing \( q \) units of output?
3. What are the marginal cost of production and the average total cost, average variable cost and the average fixed cost?
4. Derive the firm’s short run supply curve.

Exercise 2 [40]: Suppose a production function is given by \( f(K, L) = K + L \), and that the price of capital is $2 and the price of labor is $4.

1. Derive the marginal product and the average product for labor.
2. Derive the marginal product and the average product for capital.
3. Long Run analysis
   (a) What combination of labor and capital minimizes the cost of producing any given output?
   (b) What is the minimum cost of producing \( q \) units of output?
   (c) What are the marginal cost of production and the average cost?
   (d) Derive the firm’s long run supply curve.

Exercise 3 [30]: The domestic supply and demand curves for Jolt coffee beans are given by \( P = 10 + Q \) and \( P = 100 - 2Q \), respectively, where \( P \) is the price in dollars per bushel, and \( Q \) is the quantity in millions of bushels per year. There is perfect competition in the world market and thus the total world supply is \( P = 10 \).

1. In absence of government policy, the U.S. supply is the world supply. What is the consumers’ surplus at the equilibrium price? What is the producer surplus?
2. Imagine now that the Congress restricts the importation of Jolt coffee beans. It is a very drastic policy and no importation is allowed. The only relevant supply is now the domestic supply. What is the consumers’ surplus? What is the producers’ surplus?
3. What is the effect of this policy on the total welfare? what is the deadweight loss?