

**Problem 1:** A Firm has the following production function:  $Q = \sqrt{KL}$ . Further we know that  $w = 36$  and  $r = 9$ .

- (a) Derive short run cost function when the amount of capital is fixed:  $\bar{K} = 9$
- (b) Derive long run cost function

**Problem 2:** Total cost function of an individual firm facing perfect competition is given by relation:

$$TC(Q) = Q^3 - 20Q^2 + 150Q$$

Find the optimal level of production (supply function) of this firm. For what prices would the firm earn a positive profit? Negative profit? Zero profit?

**Problem 3:** The demand for oranges is  $q = 120 - 4p$  and the supply is  $q = 2p - 30$ , where  $p$  is the price measured in dollars per hundred pounds and  $q$  is the quantity measured in hundred pound units.

- (a) On one graph, draw the demand curve and the supply curve for oranges.
- (b) Write down the equation that you would solve to find the equilibrium price.
- (c) What is the equilibrium price of oranges? What is the equilibrium quantity? Show the equilibrium price and quantity on the graph and label them  $p_1$  and  $q_1$ .
- (d) A terrible drought strikes California, traditional homeland of oranges. The supply schedule shifts to  $2p - 60$ . The demand schedule remains as before. Draw the new supply schedule. Write down the equation that you would solve to find the new equilibrium price of oranges.
- (e) What is the new equilibrium price of oranges? What is the new equilibrium quantity? Show the equilibrium price and quantity on the graph and label them  $p_2$  and  $q_2$ .