

Microeconomics  
HUL 212  
Major Examination, Fall 2022

Answer any two questions from (3), (4) and (5). All other questions are compulsory.

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1. Provide reasoning for each of the following statements explaining why they are True or False or Uncertain:
  - A consumer finds two commodities perfectly substitutable. The optimal bundle for this consumer will always be a corner solution. [2]
  - A's monthly income is Rs.1000. He spends 40 per cent of his income on food. The government thinks that it is unfair that someone spends more than 35 per cent of his or her income on food. In order to lower the proportion of income spent on food, the government provides an additional income of Rs. 200 to A. Given the income elasticity of demand of food is 2, the government achieves its target. [3]
  - $f(L, K) = L^{0.5} + K^{0.5}$  is a production function that satisfies decreasing returns to scale. A fixed proportions technology however displays constant returns to scale. [3]
  - Consider a strategic form game. Any Nash equilibrium yields an outcome where every player is better off compared to any non-Nash equilibrium outcome. [2]
2. Solve the following problems along with adequate explanation for every step:



- Let  $u(x, y) = 2\sqrt{x} + y$ . Let  $I = 100$ ,  $p_x = 3$  and  $p_y = 1$ . If price for  $X$  falls to 2, compute total effect, substitution effect and income effect of the price change. [2+3+3]
  - Consider the fixed proportions production function  $f(L, K) = \min\{2L, 3K\}$ . Find the equation for the line joining the kink-points of the isoquants. [2]
  - Consider the following profit function:  $\pi = \zeta_1(w) + \zeta_2(r)$ , where commodity price has been normalized to 1, i.e.  $P = 1$ . Compute the functional form of the production function. [3]
  - Consider a monopolist firm produces its product at two plants that it owns. The technologies at the two plants are different and cost functions are different:  $c_1(y_1) = 4\sqrt{y_1}$  and  $c_2(y_2) = 2\sqrt{y_2}$ , where  $y_i$  is the amount produced at plant  $i$ . Compute the cost function for the monopolist. [3]
  - The production function is  $f(x) = 20x - x^2$  and the price of output is normalized to 1. Let  $w$  be the input price. Derive the profit function? [4]
3. Let  $H(L, K)$  be a production function that is homogeneous of degree 1 in  $L$  and  $K$ . Suppose that  $F(L, K)$  is a production function that is a monotonic transformation of  $H$ .<sup>1</sup> Is MRTS for  $F$  at  $(L, K)$  same as the MRTS for  $F$  at  $(tL, tK)$ ,  $t > 0$ ? [10]
  4. Derive Slutsky equation and explain the decomposition of the total effect of price change into substitution effect and income effect using the equation as well as the diagram. [10]
  5. Consider the setting of auction mechanism as discussed in the class. Show that  $b_i = v_i$ ,  $i \in I$  constitutes a Nash equilibrium of the second price auction. Is this Nash equilibrium unique? Explain. [10]

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<sup>1</sup>Such a production function is called *homothetic*.