

IIT Delhi: HUL320B-odd semester 2022-23
Selected Topics in Economics: Minor exam

Time Allowed: 1 hour; Marks: 25 (marks breakup is given at the end of each question).

1. A small price-taking farmer produces *dal* using the production function $y = \ln(1 + L)$. So only labour hours L is required to produce output y . The farmer can hire labour at wage rate w per hour. The output price is p .

(a) The farmer wishes to hire L to maximize profit. Write down a condition involving p and w such that a positive L will maximize profit.

(b) Suppose $p = 10$, $w = 2$. Solve for the profit maximizing L .

(c) Now suppose, unlike the case above, that the farmer himself/herself wants to work for \bar{L} hours. The farmer has the choice of putting in all \bar{L} hours on his/her own farm, all \bar{L} working outside his/her farm at wage w per hour; or a mix of some hours on own farm, and some outside at wage w . The farmer can also work all \bar{L} hours on his/her own farm, and hire additional labour at wage w per hour, for his/her farm.

Suppose $p = 10$, $w = 2$. For what range of \bar{L} will the farmer (i) hire additional labour on his/her farm; (ii) work some hours outside his/her own farm?

Marks: (a) 1; (b) 4; (c) 5

(2) A market served by a monopoly has consumers with 2 kinds of preferences. Type i 's utility from buying quantity q and paying T for this quantity is

$$u_i = \theta_i v(q) - T, \quad i = 1, 2$$

where $v(q) = \frac{1-(1-q)^2}{2}$, $\theta_1 = 1$, $\theta_2 = 2$ and the monopoly has zero unit cost of production (i.e. in our notation, $c = 0$).

Suppose both types of consumers populate a common market, the monopolist does not know who is who, but knows that type 1 consumers are in proportion λ . Let the demand of a Type i consumer, as a function of unit price p , be $D_i(p)$.

Suppose the monopolist wants to serve both types of consumers, so its demand is

$$D(p) = \lambda D_1(p) + (1 - \lambda) D_2(p)$$

(a) Obtain expressions for $D_1(p)$, $D_2(p)$, $D(p)$.

(b) The monopolist is permitted to choose a price scheme $T(q) = A + pq$. What will be the profit maximizing p and A ? (Hint: Think about what individual rationality constraints for the two types will permit).

(c) For what range of λ will the monopolist prefer to serve **only** the Type 2 consumers, rather than both types as it does in (2)(a) and (b)?

Marks (a) 5; (b) 5; (c) 5

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$$\frac{d(1-p)}{2} > (1-d)(1-p/2)$$

$$\frac{2-p(1+d)}{2} > \frac{(1-d)(2-p)}{2}$$

$$2-p-pd > 2-p+pd$$

$$2\lambda > 2\lambda p$$

$$\frac{d(1-p)}{2} < (1-d)(2-p)$$

$$d - dp < 2 - 2\lambda - p + pd$$

$$d(3 -$$