

4. Suppose the monopolist offers the following menu of two-part tariff to the customer

$$\widehat{M} = \{(f_1, t_1), (f_2, t_2)\} = \{(2, 1), (8, 0)\}.$$

Compute the seller's profit.

**Exercise 3** (Job Market Signaling - 40 points). Suppose that low-ability workers have productivity of  $r_L$ , while high-ability workers have productivity of  $r_H$ , where  $r_H > r_L$ . Firms can not tell low-ability workers from high-ability workers ex ante, but can observe a worker's education level  $e$ . Firms know that half of all workers are low-ability, and half are high-ability.

Any worker can acquire as much education as she wishes, but getting  $e$  units of education costs a low ability worker  $c \cdot e^2$ , where  $c > 1$ , and costs a high-ability worker  $e^2$ . Assume the labor market is competitive, so that a worker earns her expected productivity.

1. Suppose  $r_H = 15$ ,  $r_L = 1$ , and  $c = 3$ . Does there exist a pooling equilibrium in which both high- and low-ability workers get 1 unit of education? If so, describe a wage function and the belief system that support this equilibrium outcome. If not, explain why.
2. Suppose  $r_H = 15$ ,  $r_L = 1$ , and  $c = 3$ . Does there exist a pooling equilibrium in which both high- and low-ability workers get 2 units of education? If so, describe a wage function and a belief system that support this equilibrium outcome. If not, explain why.
3. Suppose  $r_H = 15$ ,  $r_L = 1$ , and  $c = 3$ . Does there exist a separating equilibrium in which high-ability worker gets 3 units of education? If so, describe a wage function and a belief system that support this equilibrium outcome. If not, explain why.
4. For general  $r_H$ ,  $r_L$ , and  $c$ , solve for the least-cost separating equilibrium. How does the level of education obtained by the high types vary in  $c$  in this equilibrium? What is the intuition?
5. Suppose  $c < 1$  instead. Does there exist a separating equilibrium? If yes, find the least-cost separating equilibrium. If not, explain why.