

## ECON4240 - Spring semester 2015

### Problem 1

Assume a single firm and a single consumer. The firm's product may be of high (H) or low quality (L); probability of being high quality is  $\lambda$ . The firm knows the quality of its product but the consumer does not observe the quality before purchase. Assume that the consumer is risk neutral.

For  $i = L, H$ , the consumer's valuation is given by  $v_i$  and the costs of production by  $c_i$ . The consumer desires at most one unit of the product. Finally, the firm's price is regulated and is set at  $p$ .

Assume  $v_H > p > v_L > c_H > c_L$ .

(i) Given  $p$ , under what conditions (involving the other variables) will the consumer buy the product?

(ii) Suppose that before the consumer decides to buy, the firm (which knows its type) can advertise. Advertising conveys no information directly, but consumers can observe the total amount of money spent on advertising; call it  $A$ . Can there be a *separating* perfect Bayesian equilibrium, that is, an equilibrium in which the consumer rationally expects firms with different quality levels to pick different levels of advertising? If yes, describe one; if no, then argue why not.

### Problem 2

A worker can exert two effort levels, good or bad, which induces a production error with probability 0.25 and 0.75, respectively.

The worker's utility function is  $U(w, e) = 100 - (10/w) - e$ , where  $w$  is the wage received and  $e$  takes the value 2 if effort is good and 0 if effort is bad.

Production errors are observable and can be introduced into the worker's contract, but effort is unobservable. The product obtained is worth 20 if there are no errors and 0 otherwise.

The principal is risk-neutral. Assume that the worker has reservation utility 0.

Calculate the optimal contract and the effort the principal desires, both under conditions of symmetric information and asymmetric information on the agent's behavior.