

Information Economics, Fall 2015

Pre-lecture Problems for Lecture 10

Instructor: Ling-Chieh Kung
Department of Information Management
National Taiwan University

Note. The deadline of submitting the pre-lecture problem is *9:20am, November 23, 2015*. Please submit a hard copy of your work to the instructor in class. Late submissions will not be accepted. Each student must submit her/his individual work. Submit **ONLY** the problem that counts for grades.

1. (0 points) Consider the binary outcome model introduced in the videos. Let the agent be risk-averse and action be observable.
 - (a) Given that $w_1 = w_2$ at any optimal contract, let $w = w_1 = w_2$ and reformulate the problem to a one with only two variables.
 - (b) Use the KKT condition to show that an optimal contract to the problem satisfies $w_1 = w_2 = w$, $u(w) = a$, and $p'(a) = \frac{1}{u'(w)}$.
2. (0 points) Consider the binary outcome model introduced in the videos. Let the action be unobservable. The optimality condition is derived in page 27 of the slides.
 - (a) Show that if the agent is risk-neutral, then $u'(w_0) = u'(w_1) = 1$.
 - (b) Show that if the agent is risk-neutral, then $\mu = 0$.
 - (c) Show that if the agent is risk-neutral, the unobservability of the action does not result in a moral hazard problem.
3. (10 points; 5 points each) Consider the LEN model introduced in the videos. Now, let the agent's cost of taking action a be $\frac{1}{2}ca^2$ rather than $\frac{1}{2}a^2$, where $c > 0$ is exogenous.
 - (a) Given a contract (t, s) , show that the optimal action that will be chosen by the agent is $a^* = \frac{s}{c}$. Make some comments on the impact of c on a^* .
 - (b) Show that the optimal contract satisfies $s^* = \frac{1}{1+\eta c \sigma^2}$. Make some comments on the impact of c on s^* .