

# Information Economics, Fall 2016

## Pre-lecture Problems for Lecture 8

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**Note.** The deadline of submitting the pre-lecture problem is *9:20am, November 7, 2016*. 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) The probability of tossing an unfair coin and get a head is  $p$ . We know that  $p \in \{0.3, 0.5\}$ , but we do not know its exact value. Our prior belief on  $p$  is  $\Pr(p = 0.3) = 0.2 = 1 - \Pr(p = 0.5)$ . Let  $X$  be 1 if we get a head after one toss and 0 otherwise.
  - (a) Find the following conditional probabilities:  $\Pr(X = 1|p = 0.5)$  and  $\Pr(X = 0|p = 0.3)$
  - (b) Find the following joint probabilities:  $\Pr(X = 1, p = 0.5)$  and  $\Pr(X = 0, p = 0.3)$
  - (c) If we toss once and get  $X = 0$ , find the posterior distribution of  $p$ :  $\Pr(p = 0.3|X = 1)$  and  $\Pr(p = 0.5|X = 1)$ .
  
2. (0 points) Consider the warranty example introduced in the video.
  - (a) Explain why  $((1, 0), (B, N), (1, 0))$  is an equilibrium (cf. page 21 of the slides).
  - (b) Explain why  $((0, 1), (N, B), (0, 1))$  is not an equilibrium (cf. page 22 of the slides).
  - (c) Explain why  $((1, 1), (B, B), (\frac{1}{2}, [0, 1]))$  is not an equilibrium (cf. page 23 of the slides).
  - (d) Explain why  $((1, 1), (B, N), (\frac{1}{2}, [0, 1]))$  is not an equilibrium (cf. page 23 of the slides).
  - (e) Explain why  $((0, 0), (B, N), ([\frac{1}{3}, 1], \frac{1}{2}))$  is not an equilibrium (cf. page 24 of the slides).
  - (f) Explain why  $((0, 0), (N, N), ([0, \frac{1}{3}], \frac{1}{2}))$  is an equilibrium (cf. page 24 of the slides).
  
3. (10 points) Consider the warranty example introduced in the video. Suppose that the unreliable firm now earns 1 (instead of  $-1$  of offering a warranty and having the customer buying the product). Will this signaling game has a separating equilibrium? Prove your arguments.