Information Economics, Spring 2018
Pre-lecture Problems for Lecture 8

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Note. The deadline of submitting the pre-lecture problem is ***9:30am, May 11***. 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.