1 Problem Set 5 (for January 26)

– Consider a Bayesian game Γ_1 with incomplete information in which player 1 may be either type α or type β. Where player 2 thinks the probability of type α is .9 and the probability of type β is .1. Player 2 has no private information. The payoffs to the two players are shown in the tables below, where the left table asserts $t_1 = \alpha$ and the right $t_1 = \beta$.

	x_2	y_2
x_1	$2, 2$	$-2, 0$
y_1	$0, -2$	$0, 0$

	x_2	y_2
x_1	$0, 2$	$1, 0$
y_1	$1, -2$	$2, 0$

Show the existence of a Bayesian equilibrium in which player 2 chooses x_2. $(*)$

– Suppose that Γ_1 is altered by a preplay communcation process. If player 1 is type β, then he sends no letter to player 2. Otherwise, player 1 sends to player 2 a letter saying "I am not type β". Thereafter, each time either player receives a message, he sends back a letter confirming the receipt of the most recent letter. Any letter has the probability .1 of being lost. The game continues until one is lost. Note that every player remembers the number of letters received.

(a) After the players have stopped sending letters (or never send any letters), what probability would player 2 assign to the event that a letter sent by player 1 was lost in the mail?

(b) If player 1 is not type β, what is the probability that player 1 would assign to the event that a letter sent by player 1 was lost?

(c) Show that there is no Bayesian equilibrium of this game in which player 2 ever chooses x_2.

– Let Γ_2 be a two-person zero-sum game in strategic form. Show that the set

$$\{\sigma_1 \mid \sigma \text{ is an equilibrium of } \Gamma_2\}$$

is a convex subset of the set of randomised strategies for player 1. $(*)$