EVOLUTION AND THE THEORY OF GAMES

Exercises 28-2-2013

11. (4 points) Generalize the Bishop-Cannings theorem: Let $X \subset R$ be an interval, and let $F : X \to R$ be a distribution function representing a mixed strategy over X with some support. Show that if F is an ESS, then $\pi_1(x, F) = \pi_1(F, F)$ for all x in the support of F, where π is continuous with respect to x.

12. (4 points) Let F and G be two different distribution function over some interval $x \subset R$. Show that if F and G are both ESSs, then the support of one cannot be a subset of the other (and *vice versa*).

13. The 'Size Game' is related to the War of Attrition, but in contrast to the latter, the cost of displaying is paid before the game starts and is not refunded. Does the Size Game have **(a)** (2 points) a pure ESS or **(b)** (4 points) a mixed ESS with full support?

14. (6 points) Who takes care of the kids? Suppose a male has two possible strategies: he can be faithful and help the female with taking care of the offspring, or he can philander and abandon the female right after mating. A female also has two possible strategies: she can be coy by demanding a long courtship period before mating or she can be fast by skipping the courtship. Philandering males and coy females dont get along and do not mate, but other combinations of males and females do mate. The reward of producing offspring is $R/2$ per player. The cost of rearing the offspring is C, which is either shared by the parents if the male is faithful, or which is borne totally by the female otherwise. The cost of courtship is d to both the male and the female. Give the payoff matrix and analyze the game as an asymmetric game.

15. (6 points) Solve the Hawk-Dove-Assessor game when the Assessor knows its own rank regarding, say, strength within the population as a whole and assuming that the stronger player always wins in a H×H-contest. How does the ESS depend on the cost of assessment and on the Assessor's own rank?