Stat 155 Homework # 8 Due April 14

Problems:

Q 1 Karlin-Peres Chapter 3 Q 3.4

Q 2 We introduce a third type to the hawk and dove game called bourgeois which will only fight if it got to the resource first. If we assume that the bird are equally likely to find the food first then the expected payoff matrix is

$$\begin{pmatrix} (\frac{v}{2}-c, \frac{v}{2}-c) & (v,0) & (\frac{3v}{4}-\frac{c}{2}, \frac{v}{4}-\frac{c}{2}) \\ (0,v) & (\frac{v}{2}, \frac{v}{2}) & (\frac{v}{4}, \frac{3v}{4}) \\ (\frac{v}{4}-\frac{c}{2}, \frac{3v}{4}-\frac{c}{2}) & (\frac{3v}{4}, \frac{v}{4}) & (\frac{v}{2}, \frac{v}{2}) \end{pmatrix}.$$

Find the evolutionary stable strategies.

Historical Note: The game together with the label bourgeois was given by the famous biologist John Maynard Smith, politically a communist, who considered it "politically bourgeois" to value ownership

Q 3 Two wolves can each choose to hunt deer or rabbit. A wolf hunting rabbit will succeed and get payoff r. If a single wolf hunts the deer it will fail and have payoff 0 while if both hunt deer together by co-operating they may succeed and each get expected payoff $s/2$. Write down the expected payoff matrix and when $s > 2r$ find the evolutionary stable strategies.

Q 4 Two players each are each given an independent number uniform in $\{0, 1, 2\}$ which only they see. The first player may "pass" in which case the game ends and no money changes hands or may choose to "play". The second player may "pass" in which case he gives $ 1 to player 1. If player 2 chooses to "play" then the player with the higher number wins $ 2 from the player with the lower number. No money changes hands if both play and it is a tie. Find the Nash equilibria for the game.