Day 9: Homework

Question 1 : Consider the three-round bargaining game we played in class. In the first round, P1 has to divide \$1 between P1 and P2. P2 has the opportunity to ACCEPT or REJECT. If P2 ACCEPTS, they get money according to P1's division. If P2 REJECTs, they go to the second round. In the second round, P2 has to divide \$0.90. If P1 ACCEPTS, they get the money according to P2's division. If P1 REJECTs, they will go to the third round. In the third round, P1 will divide \$0.81 and if P2 rejects again both P1 and P2 get nothing.

How should P1 divide the money in the first round?

Question 2 :
Consider a variation of the bargaining game above. Player 1 divides a payoff of 1 between Player 1 and Player 2 however player 1 likes (it doesn't have to be in terms of cents. Player 1 can give Player 2 .00001 points if he/she wants). If Player 2 ACCEPTs, they will divide the points that way. If Player 2 REJECTS, they will both get 0 points. Assume also that whenever any player's payoff is the same whether that player ACCCEPTs or REJECTs, that player will always pick ACCEPT.
In the first round, they are dividing 1 point. In the 2nd round, they are dividing δ points. In the third round, they are dividing δ^2 points, etc. for $\delta < 1$

(a) Using these new rules, how should Player 1 divide the points in a 1-round game?

(b) How should Player 1 divide the points in the first round of a 2-round game?

(c) How should Player 1 divide the points in the first round of a 3-round game?

(d) How should Player 1 divide the points in the first round of an n-round game, where $n > 3$?

(e) How should Player 1 divide the points if the game only ends when either player accepts an offer? (Hint: take the limit as $n \to \infty$. You can use the geometric series sum rule: that $1 - \delta + \delta^2 - \delta^3 + \delta^4 - \ldots = 1/(1 + \delta)$).

Question 3: State if Zermelo's theorem applies for Connect 4. If you think it does not, explain why not. If you think it does, explain why it satisfies all the hypotheses of the theorem. You can play Connect 4 here: `http://www.coolmath-games.com/0-connectfour`