**Question 1**

a)

Given that player 1 believes that player 2 randomizes, the expected payoffs of player 1 are as follows:

Where ,

This function is maximized if .

Player 1 will choose to play .

b)

We can follow the same procedure for player 2,

Where

This function is maximized if .

Player 2 will choose to play .

c)

As we have concluded from question b, player 2 would play as a level-1 player, given this strategy:

This function is maximized if .

Player 1 would choose to play .

d)

As we have concluded from question a, player 1 would play as a level-1 player, given this strategy:

This function is maximized if .

Player 2 would choose to play .

e)

With , the probability with which player 1 expects player 2 to play as a level-0 player is equal to:

Where,

And

Thus the probability with which player 1 expects player 2 to play as a level-0 player equals .

And the probability with which player 1 expects player 2 to play as a level-1 player equals.

Player 1 can now maximize its payoffs for :

This function is maximized if .

Player 1 would choose to play .

f)

Player 2 now estimates player 1 to play

This function is maximized if .

Player 2 would choose to play .

g)

The Nash equilibrium of this game can be calculated as follows:

This system of equations only leaves no incentives to deviate if and only if and . This can be concluded after starting from a starting point and subsequently best responding for both players.

h)

i)

**Question 2**

**Question 3**

a)

A level-1 player expects a level-0 player to bid . Given this expectation, a level-1 player expects to win with certainty if , and with probability . The expected utility of player 1 is now as follows:

This function is maximized if .

b)

c)

d)

Playing your own value is the best response to each player as it is a dominant strategy, For each Level-k player it is thus optimal to bid their private value.

**Question 4**

a)

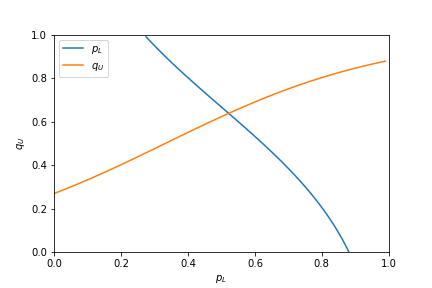
By inspection, (U, L) and (D, R) are PSNE’s

Mixed:

Thus, the MSNE of this game is

b)

The QRE if the probability that player Ron will choose strategy U is given by:

c)  
  
If x=2:  
  
The intersection is at

d) Twan’s answer

**Question 5**

**Question 6**

e)

a)

b)

c)

d)

e)

**Question 7**

a)

b)

c)

d)

e)

**Question 8**

**Question 9**