IS609 Assignment #9

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1

Rose chooses R1 every time. Colin chooses C2 or C2.

The game equilibrium equals 10. However, it is not a pure strategy Nash Equilibrium since Colin can choose either C2 or C3 and get the same result.

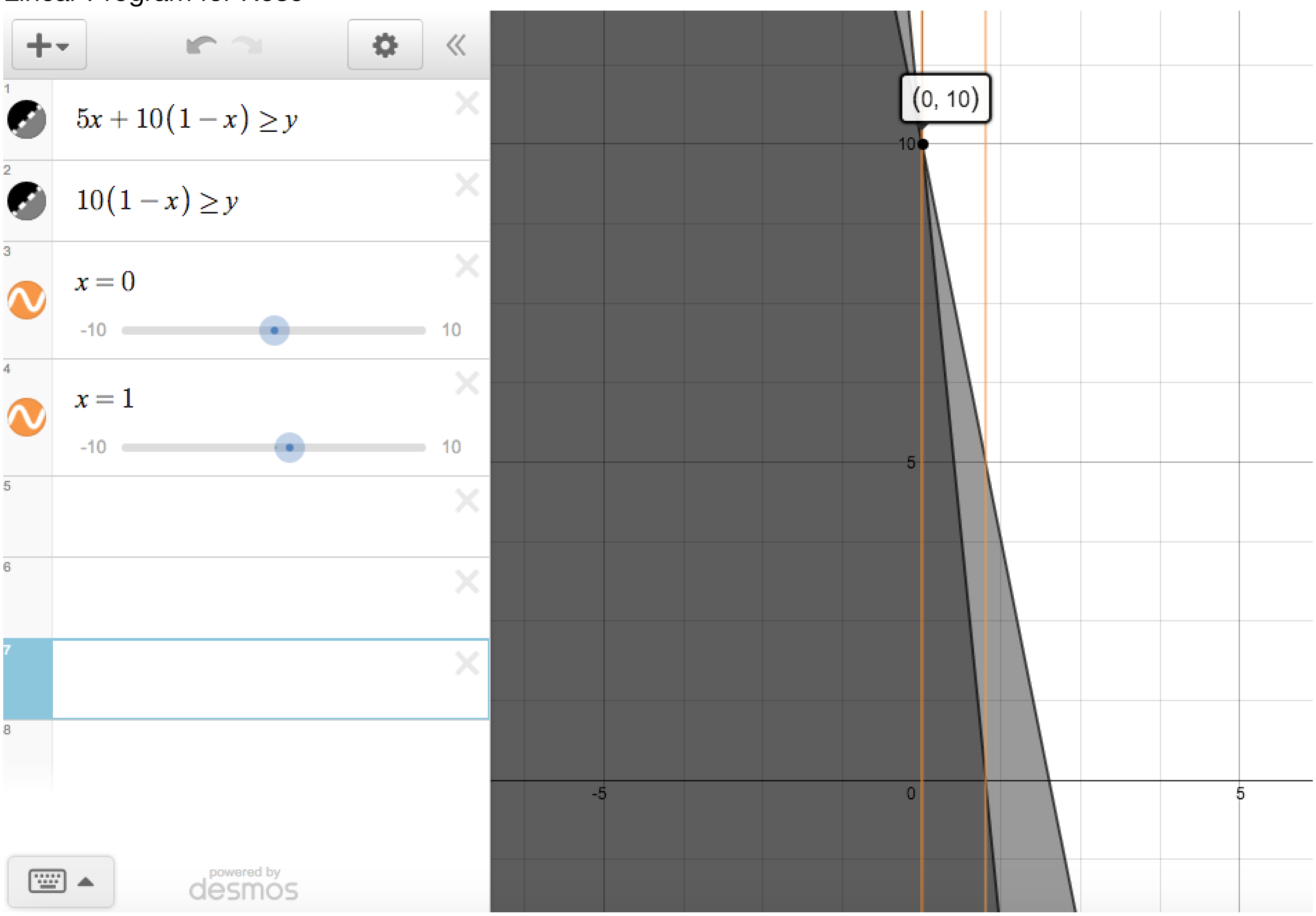
2

Pitcher chooses knuckleball every time, it is a dominant strategy. The Batter must subsequently guess knuckleball each time.

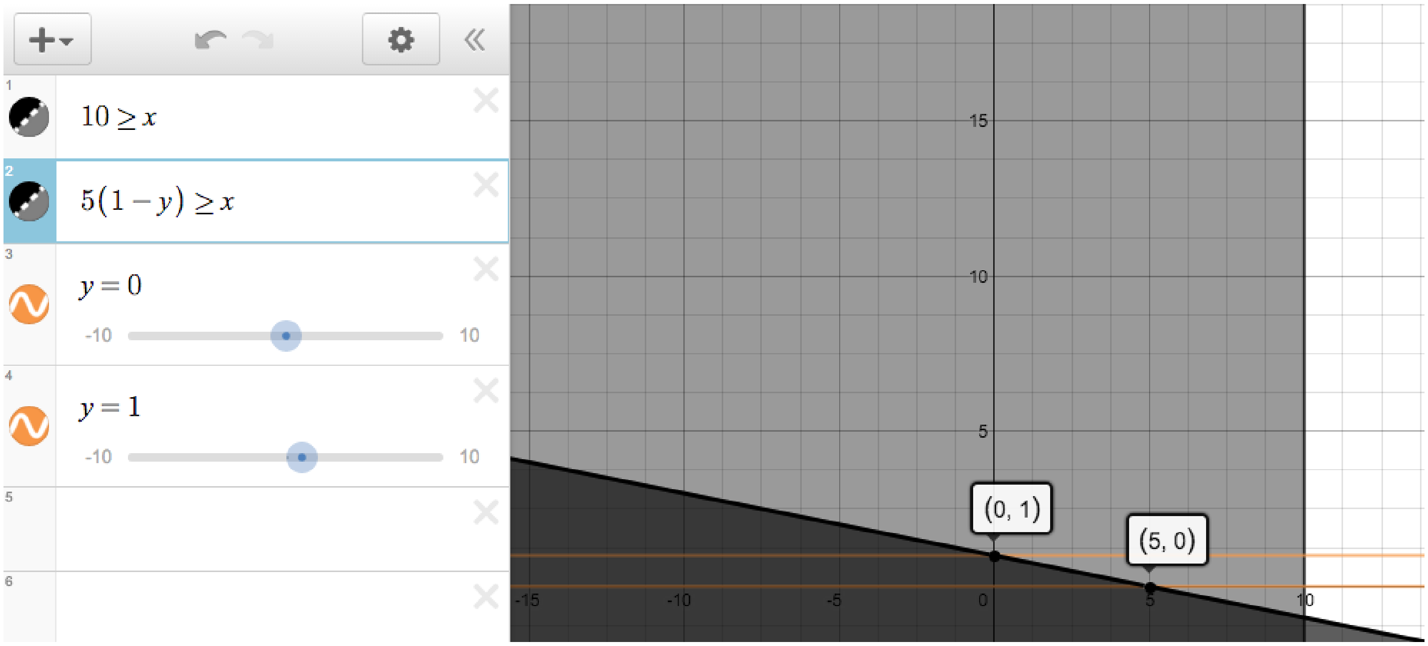
The pure strategy Nash equilibrium equals 0.250.

3

Linear Program for Rose



Linear Program for Colin



4

```
library(lpSolve)
```

```
payoff.matrix <- as.matrix(rbind(
  c(3000, 4500, 6000),
  c(1000, 9000, 2000),
  c(4500, 4000, 3500)))
```

5

Maximin = 20, Minimax = 15, therefore no pure strategy staddle point exists.

Colin plays C1 or C2 Rose plays R1 Game value: 10

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a. equating expected value

First, check for pure strategy saddle point:

		Colin		
		C1	C2	Maximin
Rose	R1	0.5	0.3	0.3
	R2	0.6	1	0.6
	Minimax	0.6	1	

One exists at C1, R2 and equals 0.6.

Rose $EV(1)\ 0.5(x) + (0.6)(1-x)$

$EV(2)\ 0.3x + 1(1-x)$

$0.5x + 0.6(1-x) = 0.3x + (1-x)$

$-0.3x \qquad -0.3x$

$0.2x + 0.6(1-x) = (1-x)$

$-(1-x) \qquad -(1-x)$

$0.2x - 0.4(1-x) = 0$

$0.2x - 0.4 + 0.4x = 0$

$0.6x = 0.4$

$x = \frac{2}{3}$

$EV = \frac{1}{2} \cdot \frac{2}{3} + \frac{3}{5}\left(1-\frac{2}{3}\right)$

$ev = \frac{2}{6} + \frac{3}{15}$

$= \frac{8}{15}$

Colin $EV(1) = 0.5(x) + 0.3(1-x)$

$EV(2) = 0.6(x) + 1(1-x)$

$0.5x + 0.3(1-x) = 0.6x + (1-x)$

$-0.5x \ -0.3(1-x) \qquad -0.5x \ -0.3(1-x)$

$0 = 0.1x + 0.7(1-x)$

$0 = 0.1x + 0.7 - 0.7x$

$+0.7$

$+0.7 = 0.6x$

$\frac{7}{6} = x$

$Ev = \frac{1}{2} \cdot \frac{7}{6} + \frac{3}{10} \cdot -\frac{1}{6} = \frac{7}{12} + -\frac{3}{60} = \frac{8}{15}$

b. methods of oddments

This method cannot be used due to the saddle point.

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			Colin		
			C1		C2
Rose	R1		(1,2)	←	(3,1)
			↓		↓
	R2		(2,4)	←	(4,3)

If both players maximize strategy, the likely outcome is (2,4).

Rose R1	Colin does:	C1	Outcome:	(1,2)
Rose R2	Colin does:	C1	Outcome:	(2,4)
Rose chooses R2				
Colin C1	Rose does:	R2	Outcome:	(2,4)
Colin C2	Rose does:	R2	Outcome:	(4,3)
Colin chooses R2				
Rose moves first: (2,4)				
Forcing Colin to move first: (4,3)				
Rose can threaten to do R1, which would give Colin only 2.				
If Rose then convinces him to do C2, on the threat of her doing R1,				
she can play R2 and maximize her gain at 4. Colin is ensured not to get				
his 2nd lowest score (2).				

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		Ike's Strategies		
		L	M	C
Doc's Strategies	L	(3, -5)	(3, -8)	(3, -10)
	M	(6, -5)	(6, -8)	(6, -10)
	C	(10, -5)	(10, -8)	(-10, -10)
		Ike's Strategies		
Payoff Matrix		L	M	C
Doc's Strategies	L	-2	-5	-7
	M	1	-2	-4
	C	5	2	-20

The most likely outcome is for both players to try from long range on their first shot, with an expected value of -2 for Doc Holiday since he's the worse long-range shot.