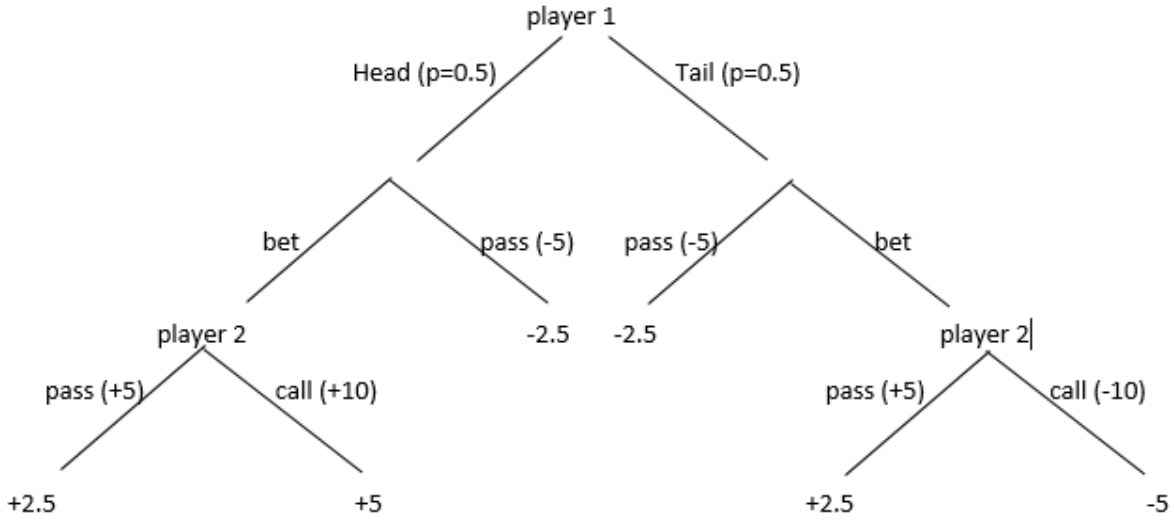
Problem 15.4-2

Re: Prob 15.3-2 (a):



Tree diagram from player 1's viewpoint w/ fair coin

Player 1:

strategy 1 = Head (pass), Tail (pass)

strategy 2 = Head (pass), Tail (bet)

strategy 3 = Head (bet), Tail (pass)

strategy 4 = Head (bet), Tail (bet)

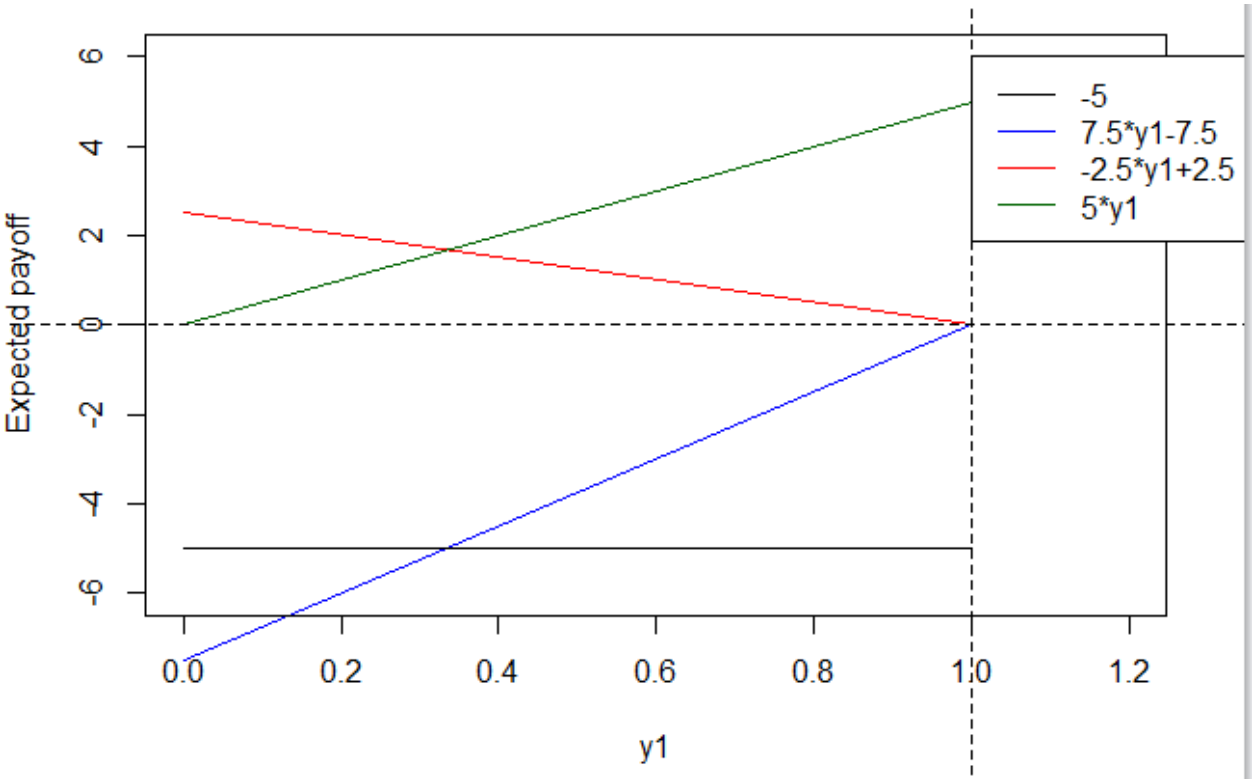
When player 1 bets, player 2:

strategy 1 = pass

strategy 2 = call

	Player 2				Expected Payoffs for Player 2
Player 1	Strategy		One (pass)	Two (call)	
		p	y_1	$1 - y_1$	
	One	x_1	(-2.5) + (-2.5) = -5	(-2.5) + (-2.5) = -5	-5
	Two	x_2	(-2.5) + (2.5) = 0	(-2.5) + (-5) = -7.5	$7.5\ y_1 - 7.5$
	Three	x_3	(2.5) + (-2.5) = 0	(5) + (-2.5) = 2.5	$-2.5\ y_1 + 2.5$
	Four	x_4	(2.5) + (2.5) = 5	(5) + (-5) = 0	$5\ y_1$

Payoff table for player 1



From the perspective of player 2:

The expected payoffs for player 2 over the range of $0 <= y_1 <= 1$ for the four pure strategies available to player 1:

$\overline{v} = v = \min \{ \max \{ -2.5\, y_1 + 2.5 , 5\, y_1 \} \}$ over the range of $0 <= y_1 <= 1$

solve for the value of y_1 where these 2 lines intersect, set $-2.5\, y_1 + 2.5 = 5\, y_1$ $y_1 = 1/3$
$y_2 = 2/3$

Optimal mixed strategy for player 2 is $(y_1, y_2) = (0.3333, 0.6667)$

Value of the game: $v = 5\, y_1 = 5\, (1/3) = 5/3 = 1.6667$

The expected payoffs for player 1 = $x_1(-5) + x_2(7.5\, y_1 - 7.5) + x_3(-2.5\, y_1 + 2.5) + x_4(5\, y_1)$

$X_1 = 0$ and $x_2 = 0$, $x_3(-2.5\, y_1 + 2.5) + x_4(5\, y_1) = 5/3$

$2.5\, x_3 = 5/3$ when $y_1 = 0$ and $5\, x_4 = 5/3$ when $y_1 = 1$

Optimal mixed strategy for player 1 is $(x_1 = 0, x_2 = 0, x_3 = 2/3, x_4 = 1/3)$

Value of the game: $\underline{v} = v = 2/3\, (-2.5 \times 1/3 + 2.5) + 1/3\, (5 \times 1/3) = 5/3 = 1.6667$