Problem 22

Thursday, March 25, 2021 4:29 PM

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Suppose the offense, trailing by 5 points, has the ball on the 3 yard line with 1 second left on the game clock. Neither team has any timeouts remaining. The offense can choose personnel better suited to run or personnel better suited to pass. The defense can choose personnel better suited to defend the run or better suited to defend the pass.

If both choose run the probability of a touchdown is 0.25.

If the offense chooses pass and the defense chooses run, the probability of a touchdown is 0.75.

If the offense chooses pass and the defense chooses pass, the probability of a touchdown is 0.4.

If the offense chooses run and the defense chooses pass, the probability of a touchdown is 0.5.

Idk anything about football

should've used probabilities

a) Assume moves are simultaneous. Show there is no pure strategy equilibrium and find the mixed strategy equilibrium. What is the probability of a touchdown in equilibrium?

O\D	Run	Pass
Run	(.25·6),(.75·-6)	(.5·6),(.5·-6)
Pass	(.75·6),(.25·-6)	(.4·6),(.6·-6)

(row, column)

I'm going with the defense being -6 because 0 doesn't make sense. If the payoff was zero, then there would be a pure strategy equilibrium and the question says there isn't one.

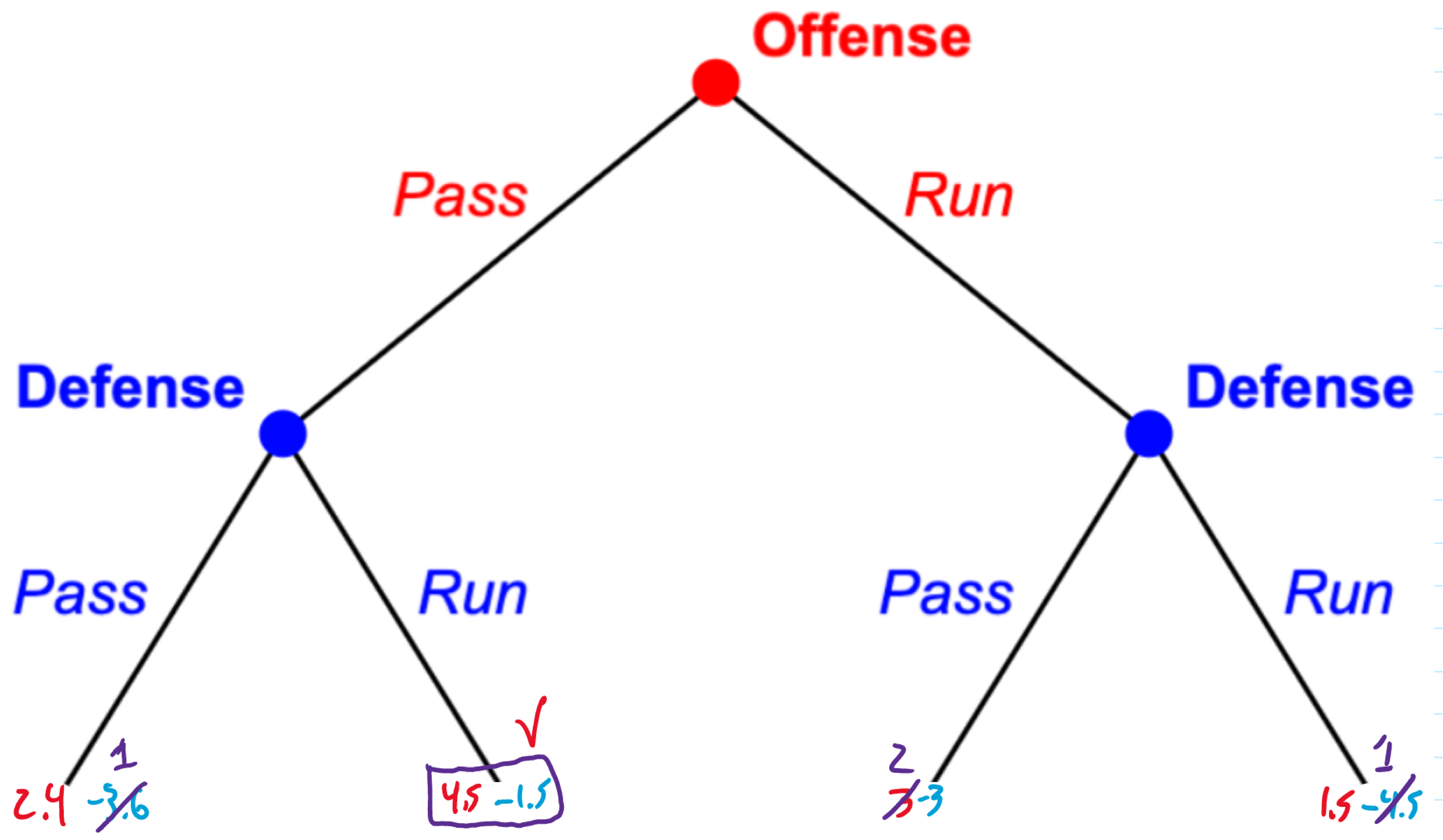
Values are positive

O\D	Run		Pass	
Run	1.5	-4.5	3	-3
Pass	4.5	-1.5	2.4	-3.6

$1.5q + 3(1-q) = 4.5q + 2.4(1-q) \rightarrow q = 1/6 \qquad 1-q = 5/6$

$4.5q + 1.5(1-q) = 3q + 3.6(1-q) \rightarrow q = 7/12 \qquad 1-q = 5/12$

b) Show the extensive form if the offense commits to its move first and find the backward induction solution.



c) Show the extensive form if the defense commits to its move first and find the backward induction solution.