HW 9.15

Sunday, October 4, 2020 4:43 PM

Worked w/ Dr Dewey's Solutions

**15.** Suppose you know the following for a particular three-player game: The space of strategy profiles $S$ is finite. Also, for every $s \in S$, it is the case that $u_2(s) = 3u_1(s)$, $u_3(s) = [u_1(s)]^2$, and $u_1(s) \in [0, 1]$.

**(a)** Must this game have a Nash equilibrium? Explain your answer.

$u_2 = 3u_1$ $u_3 = u_1^2 \rightarrow u_1 = \sqrt{u_3}$ $u_2 = 3\sqrt{u_3}$

I'm trying to follow your solution because I don't understand.

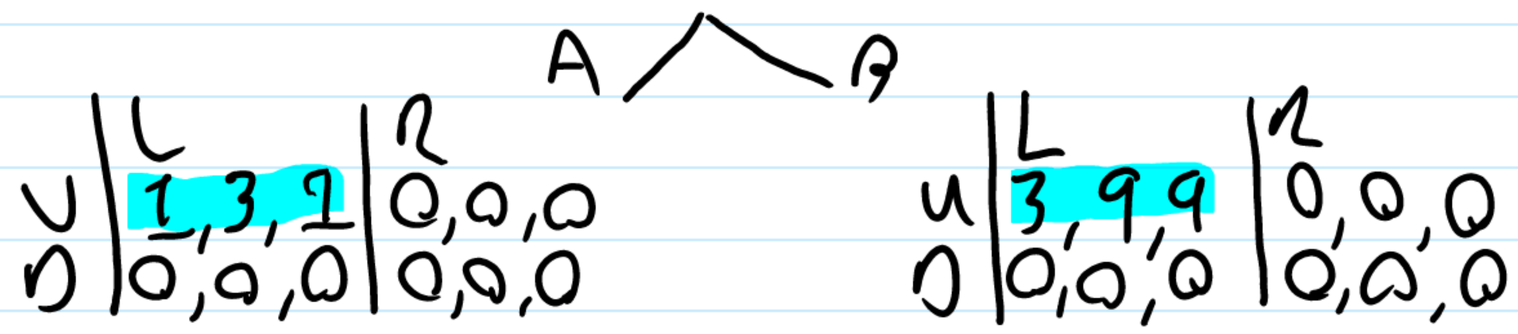
Because $u_2$ and $u_3$ are quantities of $u_1$, they always try to maximize $u_1$. This means that $V_1$ is always an NE

**(b)** Must this game have an efficient Nash equilibrium? Explain your answer.

It is efficient because of reasons stated in Part A

**(c)** Suppose that in addition to the information given above, you know that $s^*$ is a Nash equilibrium of the game. Must $s^*$ be an efficient strategy profile? Explain your answer; if you answer "no," then provide a counterexample.

There could be an inefficient, non-strict NE because conditions don't dictate only having a strict NE




$u_1, u_2, u_3$

ALU and BLU are both NE, but ALU is inefficient