

Passed Solution review

Consider a game in which, simultaneously, player 1 selects a number $x \in [2, 8]$ and player 2 selects a number $y \in [2, 8]$. The payoffs are given by:

$$u_1(x, y) = 2xy - x^2$$

$$u_2(x, y) = 4xy - y^2$$

Payoff matrix values (from image):

	$y=2$	$y=4$	$y=8$
$x=2$	28	32	64
$x=4$	0	15	60
$x=8$	192	192	192

Handwritten annotations on the matrix:

- Arrows pointing to (2,3) and (8,8) from the top.
- Arrows pointing to (2,8) and (4,6) from the bottom.

Calculate the rationalizable strategy profiles for this game.

$$u_1 \text{ d1} = 2y - 2x = -2(y-x)$$

$$u_1 \text{ d2} = -2$$

$$u_2 \text{ d1} = 4x - 2y$$

$$u_2 \text{ d2} = -2$$

$$2 \cdot 8 \cdot 2 - 8^2 = 4 \cdot 8 - 64 = 32 - 64 = -32$$

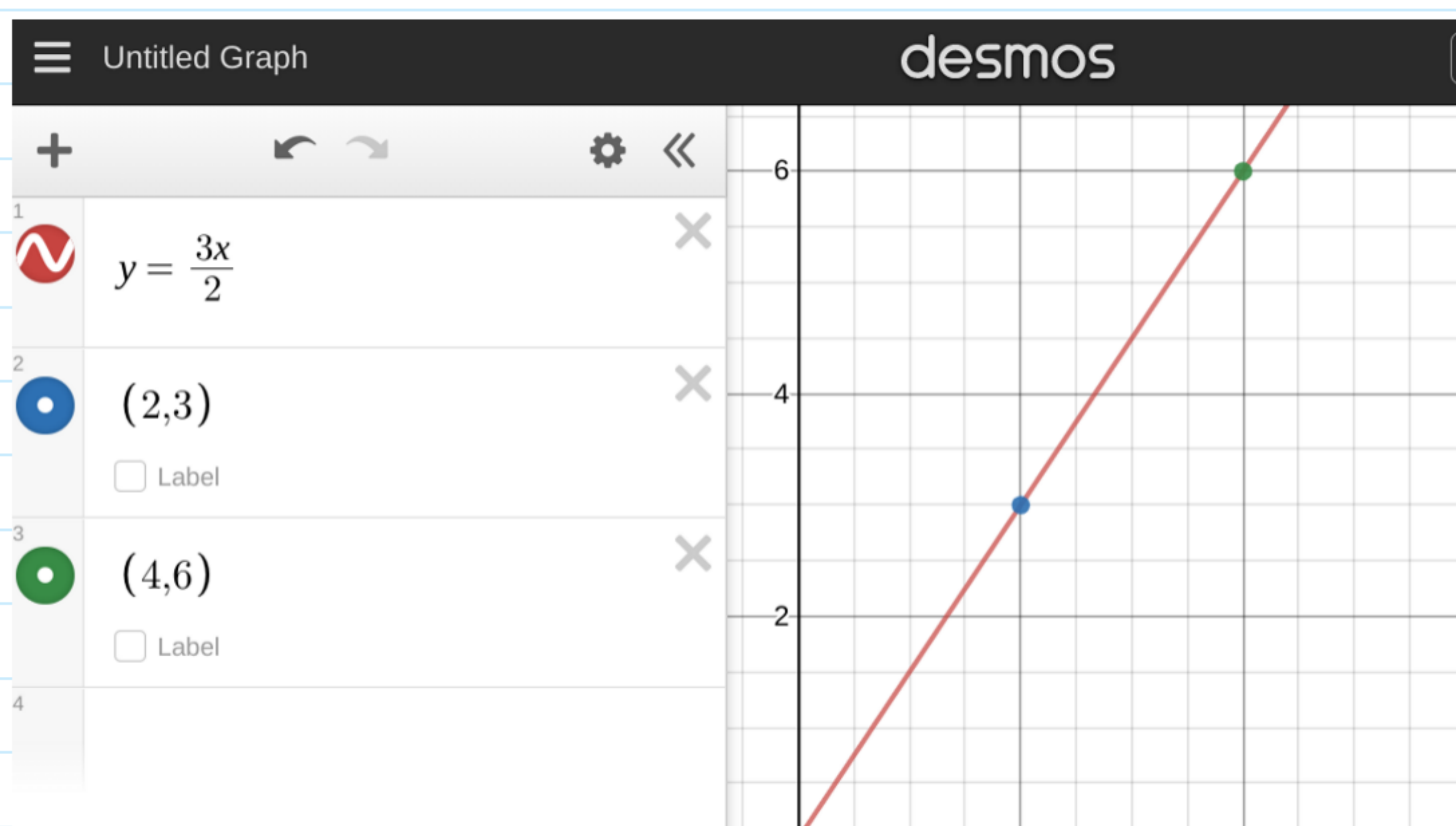
$$4 \cdot 8 \cdot 2 - 2^2 = 64 - 4 = 60$$

$$2y - 2x = 0 \Rightarrow y = x$$

$$4x - 2y = 0 \Rightarrow y = 2x$$

$\hookrightarrow x=2, y=3$ or $x=4, y=6$ are the only whole numbers between 2 and 8

But if x and y are both 8, the payoffs are $u_1=64$ and $u_2=192$



$$\frac{1}{2}[(2xy - x^2) + (4xy - y^2) + \frac{1}{4}(2xy - x^2)(4xy - y^2)] - \frac{1}{2}(2xy - x^2)^2$$

$$du_1/dx = 2\bar{y} - 2x = 0 \Rightarrow BR_1(\bar{y}) = \bar{y}$$

$$du_2/dx = 4\bar{x} - 2y = 0 \Rightarrow BR_2(\bar{x}) = \begin{cases} 2\bar{x} & \bar{x} \leq 4 \\ \bar{y} & \bar{x} > 4 \end{cases}$$

Suppose $\bar{x}=2$ then $y=4$
 $\bar{y}=4$, then $x=4$
 $\bar{x}=4$, then $y=8$
 $\bar{y}=8$, $x=8$

$\rightarrow s=(8,8)$ is the only rationalizable strategy profile