Finding R's optimal mixed strategy

Math 10120, Spring 2013

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Review: finding R's optimal mixed strategy

R and C play game w. payoff matrix $\begin{bmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{bmatrix}$, all payoffs positive

Here's what R does to find his optimal mixed (random) strategy $[r_1 \; r_2]$:

R finds the **minimum** value of

$$y_1 + y_2$$

subject to the constraints

$$
\begin{aligned}
a_{11}y_1 + a_{21}y_2 &\geq 1 \\
a_{12}y_1 + a_{22}y_2 &\geq 1 \\
y_1 &\geq 0 \\
y_2 &\geq 0
\end{aligned}
$$

R then sets $v = 1/(y_1 + y_2)$, $r_1 = vy_1$ and $r_2 = vy_2$

R's worst-case expected payoff in this case is v (given that C plays best possible counter strategy); no other mixed strategy for R gives a better worst-case expected payoff than v