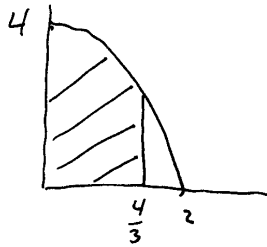


(5) (a) $s_1 + s_2 \leq 4$ $0 \leq s_1 \leq \frac{16}{9}$ $0 \leq s_2$; $u_1 = \sqrt{s_1}$, $u_2 = s_2$.
 $u_1^2 + u_2 \leq 4$ $0 \leq u_1 \leq \frac{4}{3}$, $0 \leq u_2$.



(a) Nash solution.

maximize $g(u_1, u_2) = u_1 u_2$ on $u_1^2 + u_2 = 4$.

$$\begin{cases} u_2 = \lambda \cdot 2u_1 \\ u_1 = \lambda \cdot 1 \\ u_1^2 + u_2 = 4 \end{cases} \Rightarrow \begin{cases} u_2 = 2u_1^2 = 4 - u_1^2 \\ u_1^* = \frac{2}{\sqrt{3}} \\ u_2^* = 2(\frac{4}{3}) = \frac{8}{3} \end{cases} \Rightarrow \begin{cases} 4 = 3u_1^2 \\ s_1^* = \frac{4}{3} \\ s_2^* = \frac{8}{3} \end{cases}$$

(b) Kalai-Smorodinsky.

Slope $\frac{4-0}{\frac{4}{3}-0} = 4 \cdot \frac{3}{4} = 3 = k$.

Line $u_2 = 3u_1$. Intersects $4 = u_1^2 + u_2$.

$u_1^2 + 3u_1 - 4 = 0$ $u_1^* = \frac{-3 \pm \sqrt{9+16}}{2} = \frac{-3+5}{2} = 1$

$u_2^* = 3$.

$$\begin{aligned} s_1^* &= u_1^* = 1 \\ u_2^* &= s_2^* = 3 \end{aligned}$$