

⑥ Value of payoff from $t=3$ at time $t=2$ is $(0.9x, 0.9(1-x))$

P_1 accepts offer if $s_2 \geq 0.9x$

P_2 offers $s_2 = 0.9x$

$$\begin{aligned} \text{Payoff for } P_2 \quad 1 - 0.9x &\geq 0.9 - 0.9x \\ 0.1 &\geq 0 \quad \checkmark \end{aligned}$$

Value of payoff from $t=2$ at time $t=1$ is

$$(0.9^2x, 0.9(1-0.9x))$$

P_2 accepts offer if $1 - s_1 \geq 0.9(1 - 0.9x)$
 $s_1 \leq 1 - 0.9(1 - 0.9x)$

P_1 offers $s_1 = 1 - 0.9(1 - 0.9x)$

$$\begin{aligned} \text{In } P_1 \quad 1 - 0.9(1 - 0.9x) &\geq 0.9^2x \\ 0.1 &\geq (0.9)^2x - 0.9^2x = 0 \quad \checkmark \end{aligned}$$

Therefore final payoffs

$$\begin{aligned} P_1 \quad 1 - 0.9(1 - 0.9x) &= 0.1 + 0.9^2x \\ P_2 \quad 0.9(1 - 0.9x) &= 0.9 - 0.9^2x \end{aligned}$$

If $x=0$ then

$$P_1 = 1 - 0.9 = 0.1$$

$$P_2 = 0.9$$