

SOLUTIONS PROBLEM SET 8

1)

$$\Omega_1 = (T, B)$$

$$\Omega_2 = (R, L)$$

$(x, y)$  means  $X$  if  $t=1$   
 $Y$  if  $t=2$

a) Player 1 plays B when  $t_1 = 2$   
Player 2 plays R when  $t_2 = 1$

$$P_2(B, R) = P_2(t_1=2, t_2=1) = \frac{3}{4} \cdot \frac{3}{4} = \frac{9}{16}$$

b) Player 1 plays B when  $t_1 = 2$   
Player 2 plays L when  $t_2 = 2$

$$P_2(B, L) = P_2(t_1=2, t_2=2) = \frac{3}{4} \cdot \frac{1}{4} = \frac{3}{16}$$

$$c) E_2(\Omega_1, \Omega_2) = \frac{3}{16} \cdot 0 + \frac{1}{16} \cdot 1 + \frac{9}{16} \cdot 1 + \frac{3}{16} \cdot 0 = \frac{5}{8}$$

$$d) P_2(B, R) = \frac{1}{10}$$

$$P_2(B, L) = \frac{4}{10}$$

$$E_2 = \frac{4}{10} \cdot 0 + \frac{1}{10} \cdot 1 + \frac{1}{10} \cdot 1 + \frac{4}{10} \cdot 0 = \frac{1}{5}$$

(1)

Ex 2

	LL	LR	RL	RR
TT	$\frac{20}{16}$ $\frac{31}{16}$	$\frac{15}{16}$ $\frac{24}{16}$	$\frac{5}{16}$ $\frac{7}{16}$	0   0
TB	$\frac{8}{16}$ $\frac{7}{16}$	$\frac{15}{16}$ $\frac{12}{16}$	$\frac{29}{16}$ $\frac{10}{16}$	$\frac{36}{16}$ $\frac{15}{16}$
BT	$\frac{12}{16}$ $\frac{24}{16}$	$\frac{10}{16}$ $\frac{20}{16}$	$\frac{6}{16}$ $\frac{9}{16}$	$\frac{4}{16}$ $\frac{8}{16}$
BB	0   0	$\frac{10}{16}$ $\frac{8}{16}$	$\frac{30}{16}$ $\frac{12}{16}$	$\frac{38}{16}$ $\frac{20}{16}$

Two BAYESIAN NASH EQUILIBRIA

✶

Eq 1 :    $\mathcal{S}_1 = (T, T)$     $\mathcal{S}_2 = (L, L)$

Eq 2 :    $\mathcal{S}_1 = (B, B)$     $\mathcal{S}_2 = (R, R)$

### Ex 3

highest	if high demand	$q_{1H}$	$q_2$
	if low demand	$q_{1L}$	$q_2$

problem of firm 1 when demand is high

$$\max_{\{q_{1H}\}} q_{1H} (100 - q_{1H} - q_2 - 1)$$

problem of firm 1 when demand is low

$$\max_{\{q_{1L}\}} q_{1L} (50 - q_{1L} - q_2 - 1)$$

problem of firm 2

$$\max_{\{q_2\}} \frac{1}{3} q_2 (100 - q_{1H} - q_2 - 1) + \frac{2}{3} q_2 (50 - q_{1L} - q_2 - 1)$$

USING FIRST ORDER CONDITIONS

$$q_{1H} = \frac{99 - q_2}{2}$$

$$q_{1L} = \frac{49 - q_2}{2}$$

$$q_2 = \frac{65,6 - \frac{1}{3}q_{1H} - \frac{2}{3}q_{1L}}{2}$$

$$q_2 = 23$$

$$q_{1H} = 38$$

$$q_{1L} = 13$$

EX 4)

a)

$$S_1 = \{T, M, B\}$$

$$S_2 = \{(L,L), (L,C), (L,R), (C,L), (C,C), (C,R), (R,L), (R,C), (R,R)\}$$

b)

	LL	LC	LR	CL	CC	CR	RL	RC	RR
T	2 0	1.5 0.5	2 0	1.5 0.5	<u>1</u> 1	1.5 0.5	<u>3</u> 1	<u>2.5</u> <u>1.5</u>	<u>3</u> <u>1</u>
M	<u>3</u> , <u>4</u>	<u>2</u> , 3	<u>2.5</u> 3.5	<u>2</u> 3	<u>1</u> 2	1.5 2.5	2.5 2.5	1.5 2.5	2 3
B	1, <u>3</u>	0.5 2.5	2 1.5	0.5 2.5	0 2	<u>1.5</u> 1	2 1.5	1.5 1	<u>3</u> 0

TWO BAYESIAN NASH EQUILIBRIA

1)  $S_1 = T$        $S_2 = (RC)$

2)  $S_1 = M$        $S_2 = (LL)$