

Math 304 Test 1 April 30, 2002

① $A = \begin{pmatrix} \frac{4}{3} & 1 & 0 & \textcircled{5} \\ 3 & 2 & 1 & 3 \\ 2 & \textcircled{3} & 1 & 1 \\ 1 & 1 & 2 & 3 \end{pmatrix} \quad B = \begin{pmatrix} 2 & 1 & 2 & \textcircled{4} \\ 1 & \underline{5} & 1 & 1 \\ 2 & \textcircled{4} & 3 & 1 \\ \underline{4} & 2 & 1 & 0 \end{pmatrix}$

Nash equilibria row 1 column 4 & row 3 column 2

② $u_1 = p_1 g_1 + p_2 [g_2 + 1 - g_1 - g_2] + (1 - p_1 - p_2)^2 g_2$
 $u_2 = g_1^2 g_2 + g_2 [p_2 + 3(1 - p_1 - p_2)] + (1 - g_1 - g_2)^3 p_1$

$$\left. \begin{aligned} \frac{\partial u_1}{\partial p_1} &= g_1 - 2g_2 \\ \frac{\partial u_1}{\partial p_2} &= 1 - g_1 - 2g_2 \end{aligned} \right\} \text{Set } = 0 \quad \begin{aligned} g_1 &= 2g_2 \\ 1 &= g_1 + 2g_2 = 4g_2 \\ g_2^* &= \frac{1}{4}, \quad g_1^* = 2\left(\frac{1}{4}\right) = \frac{1}{2} \\ g_3^* &= 1 - g_1^* - g_2^* = \frac{1}{4}. \end{aligned}$$

$$\frac{\partial u_2}{\partial g_1} = 2p_2 - 3p_1$$

$$\frac{\partial u_2}{\partial g_2} = p_2 + 3 - 3p_1 - 3p_2 - 3p_1 = 3 - 6p_1 - 2p_2$$

Set = 0. $2p_2 = 3p_1$ & $3 = 6p_1 + 2p_2 = 9p_1$
 $p_1^* = \frac{1}{3}, \quad p_2^* = \frac{3}{2}\left(\frac{1}{3}\right) = \frac{1}{2} \quad p_3^* = 1 - p_1^* - p_2^* = \frac{1}{6}.$