

# Module 5 Assignment

1a)

	R0	R1
Agent 0	1	2
Agent 1	1	2
Agent 2	0	0
Agent 3	0	0
Agent 4	2	1

1b)

	A0	A1	A2	A3	A4
R0	0	0	1	1	2
R1	0	0	0	0	1

1c)

	R0	R1
R0	0	1
R1	0	0

2a)

$$\begin{bmatrix} 1 & 2 \\ 1 & 2 \\ 0 & 0 \\ 0 & 0 \\ 2 & 1 \end{bmatrix} \begin{bmatrix} 1 & 1 & 0 & 0 & 2 \\ 2 & 2 & 0 & 0 & 1 \end{bmatrix} = \begin{bmatrix} 5 & 5 & 0 & 0 & 4 \\ 5 & 5 & 0 & 0 & 4 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \\ 4 & 4 & 0 & 0 & 5 \end{bmatrix}$$

2b)

$$\begin{bmatrix} 1 & 2 \\ 1 & 2 \\ 0 & 0 \\ 0 & 0 \\ 2 & 1 \end{bmatrix} \begin{bmatrix} 0 & 0 & 1 & 1 & 2 \\ 0 & 0 & 0 & 0 & 1 \end{bmatrix} = \begin{bmatrix} 0 & 0 & 1 & 1 & 4 \\ 0 & 0 & 1 & 1 & 4 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 2 & 2 & 5 \end{bmatrix}$$

$$2c) \begin{bmatrix} 0 & 0 \\ 0 & 0 \\ 1 & 0 \\ 1 & 0 \\ 2 & 1 \end{bmatrix} \begin{bmatrix} 1 & 1 & 0 & 0 & 2 \\ 2 & 2 & 0 & 0 & 1 \end{bmatrix} = \begin{bmatrix} 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \\ 1 & 1 & 0 & 0 & 2 \\ 1 & 1 & 0 & 0 & 2 \\ 4 & 4 & 0 & 0 & 5 \end{bmatrix}$$

$$2d) \begin{bmatrix} 0 & 0 \\ 0 & 0 \\ 1 & 0 \\ 1 & 0 \\ 2 & 1 \end{bmatrix} \begin{bmatrix} 0 & 0 & 1 & 1 & 2 \\ 0 & 0 & 0 & 0 & 1 \end{bmatrix} = \begin{bmatrix} 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 1 & 2 \\ 0 & 0 & 1 & 1 & 2 \\ 0 & 0 & 2 & 2 & 5 \end{bmatrix}$$

3) 9 links from each of the 4 calculations

4) To get from Agent 0 to Agent 4, we have to go from agent to resource to resource to agent

so  $X \cdot Z \cdot Y$

$$\begin{bmatrix} 1 & 2 \\ 1 & 2 \\ 0 & 0 \\ 0 & 0 \\ 2 & 1 \end{bmatrix} \begin{bmatrix} 0 & 1 \\ 0 & 0 \end{bmatrix} \begin{bmatrix} 0 & 0 & 1 & 1 & 2 \\ 0 & 0 & 0 & 0 & 1 \end{bmatrix}$$

$$= \begin{bmatrix} 0 & 1 \\ 0 & 1 \\ 0 & 0 \\ 0 & 0 \\ 0 & 2 \end{bmatrix} \begin{bmatrix} 0 & 0 & 1 & 1 & 2 \\ 0 & 0 & 0 & 0 & 1 \end{bmatrix} = \begin{bmatrix} 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 2 \end{bmatrix}$$

5) Agent 0  $\rightarrow$  RO is  $X$ .

To go from RO to A1

would be  $X^T$  and RO to

A3 would be  $Y$

so to connect them

would be  $XX^TY$ .

This would connect

Agents 0-3 to every

agent other than 4.

6) A2  $\rightarrow$  RO is  $Y^T$

and RO  $\rightarrow$  A3 is  $Y$

so  $Y^TY$ .

Code is attached separately