Networks and Complexity

Solution 22-1

This is an example solution from the forthcoming book Networks and Complexity.
Find more exercises at https://github.com/NC-Book/NCB

Ex 22.1: Konecker products [1]
Consider the matrices

$$\mathbf{A} = \begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix} \quad \mathbf{B} = \begin{pmatrix} 4 \end{pmatrix} \quad C = \begin{pmatrix} 1 & 0 \\ 0 & 0 \end{pmatrix} \tag{1}$$

Compute a) $\mathbf{A} \otimes \mathbf{B}$, b) $\mathbf{A} \otimes \mathbf{C}$ and c) $\mathbf{C} \otimes \mathbf{A}$

Solution

$$\mathbf{A} \otimes \mathbf{B} = \begin{pmatrix} 4 & 8 \\ 12 & 16 \end{pmatrix} \tag{2}$$

$$\mathbf{A} \otimes \mathbf{C} = \begin{pmatrix} 1 & 0 & 2 & 0 \\ 0 & 0 & 0 & 0 \\ 3 & 0 & 4 & 0 \\ 0 & 0 & 0 & 0 \end{pmatrix} \tag{3}$$

$$\mathbf{C} \otimes \mathbf{A} = \begin{pmatrix} 1 & 2 & 0 & 0 \\ 3 & 4 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \end{pmatrix} \tag{4}$$