Suggested problems

Matrix - matrix multiplication

P1: Let

\[ A = \begin{bmatrix} 1 & -5 & 0 & 4 \\ 7 & 6 & 1 & 1 \end{bmatrix} \quad B = \begin{bmatrix} 0 & -1 \\ 1 & 4 \end{bmatrix} \]

(a) Find the value of the element \( c_{1,3} \) in the product \( C = BA \) without performing the entire matrix multiplication.

(b) Find the value of the element \( c_{2,2} \) in the product \( C = BA \) without performing the entire matrix multiplication.

(c) Why is it not possible to compute \( AB \)? (The fact that you can’t tells you something important about matrix multiplication; in general, does \( AB = BA \)?)

P2: Let

\[ A = \begin{bmatrix} 1 & -5 & 0 & 4 \\ 7 & 6 & 1 & 1 \end{bmatrix} \quad B = \begin{bmatrix} 0 & -1 \\ 1 & 4 \\ -3 \\ 1 \end{bmatrix} \quad C = \begin{bmatrix} 1 & -5 & 0 \\ 7 & 6 & 1 \\ 1 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix} \]

Compute each of the quantities, or explain why they can’t be computed.

(a) \( 2AB \)

(b) \( (AC)B \)

(c) \( A + CB \)

(d) \( -4CB \)

P3: Checking in SciLab: to multiply matrices in SciLab (1) enter the matrices and (2) use the * operator. For example, for the matrices in P1, if I wanted to perform the entire multiplications \( AB \) and \( BA \), I’d enter

```plaintext
-->A = [1 -5 0 4; 7 6 1 1];
-->B = [0 -1; 1 4];
-->A*B
!--error 10 inconsistent multiplication
```

You can see the message you get when you try to multiply unmultiply-able things.

Check your matrix computations for P2 in SciLab.

P4: Let

\[ A = \begin{bmatrix} x & x^2 \\ 3x & 6 \\ 5 & -2x^2 \end{bmatrix} \quad B = \begin{bmatrix} -x & x + y & -1 \\ 0^2 & 4x & -3 \end{bmatrix} \]

Compute the products \( AB \) and \( BA \). Simplify the expressions as much as possible.