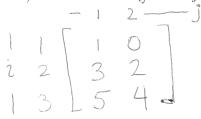
Name: Dolutron!

Directions: Show all work. No credit for answers without work.

1. [2 points] Write the (3×2) -matrix A where $a_{ij} = 2i - j$.



2. [1 point] Complete the following sentence: if A is an $(m \times n)$ -matrix, then the product AA is defined if and only if



- 3. [1 point] True or false: matrix addition is commutative.
- 4. [1 point] True or false: matrix multiplication is commutative.
- 5. [1 point] Complete the following sentence: matrix multiplication is associative since for all matrices A, B, and C, \ldots

$$(AB)C = A(BC)$$

6. [1 point] Explicitly write down a matrix X in $\mathbb{Q}^{3\times3}$ such that for every matrix A in $\mathbb{Q}^{3\times3}$, the equations AX = A and XA = A hold. What is X called?

$$\begin{array}{c}
X = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \end{bmatrix}
\end{array}$$

· X is the (3x3)-identity matrix I3

7. [3 points] Let

$$A = \left[\begin{array}{ccc} i & 2-i & 0 \\ 3 & 1 & 4-2i \end{array} \right] \hspace{1cm} B = \left[\begin{array}{ccc} i & 0 \\ 1 & 2 \end{array} \right] \hspace{1cm} C = \left[\begin{array}{ccc} 2 & -i \\ 3 & 1 \end{array} \right]$$

$$B = \left[\begin{array}{cc} i & 0 \\ 1 & 2 \end{array} \right]$$

$$C = \left[\begin{array}{cc} 2 & -i \\ 3 & 1 \end{array} \right]$$

be matrices over the field of complex numbers C. For each of the following, write the specified matrix explicitly if possible, or write "undefined" otherwise.

(a)
$$3B$$

(d) The additive inverse of
$$C$$

(b)
$$B + iC$$

(c)
$$A^*$$

$$\begin{bmatrix} i & 0 \\ 1 & 2 \end{bmatrix} \begin{bmatrix} i & 2-i & 0 \\ 3 & 1 & 4-2i \end{bmatrix}$$

$$= \begin{bmatrix} -1 & 1+2i & 0 \\ 6+i & 4-i & 8-4i \end{bmatrix}$$