Name: _____

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, ...

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?

7. **[3 points]** Let

$$A = \begin{bmatrix} i & 2-i & 0 \\ 3 & 1 & 4-2i \end{bmatrix} \qquad B = \begin{bmatrix} i & 0 \\ 1 & 2 \end{bmatrix} \qquad C = \begin{bmatrix} 2 & -i \\ 3 & 1 \end{bmatrix}$$

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

(a) $3B$

(b) $B + iC$

(c) A^*

(d) The additive inverse of C

(e) AB

(f) BA