# Linear Algebra MATH 325: Assignment 1

## ( Due in class, January 16 )

**Problem 1:** Let $z_1 = 2 - 5\,i$ and $z_2 = -1 - i$. Compute
$$z_1 - z_1 z_2; \quad (z_1 + 3z_2)^2; \quad i\,z_2 - z_1^2.$$

**Problem 2:** Use polar forms of the complex numbers
$$z_1 = 1 + \sqrt{3}\,i \quad \text{and} \quad z_2 = \sqrt{3} + i$$
to compute $z_1 \cdot z_2$ and $\frac{z_1}{z_2}$.

**Problem 3:** Compute $AB$ and $BA$ for the matrices $A$ and $B$ where
$$A = \begin{pmatrix} 1 + i & 2i \\ 2 & 3i \end{pmatrix}, \qquad B = \begin{pmatrix} -i & 3 \\ 2 + i & 4i \end{pmatrix}.$$

**Problem 4:** Find all eigenvalues for the following matrix
$$A = \begin{pmatrix} 2 & 3 & 6 \\ 6 & 2 & -3 \\ 3 & -6 & 2 \end{pmatrix}.$$
(It might help to know that $-7$ is an eigenvalue.)

**Problem 5:** Describe the set of complex numbers $z = a + b\,i$ such that $a^2 + b^2 = 1$. Show that if $z_1, z_2$ are such numbers then so are $z_1 \cdot z_2$ and $\frac{z_1}{z_2}$.