Math 115A-2: Homework 8

Due: February 26, 2016

1. Read Sections 5.2, 6.1 in Friedberg–Insel–Spence.

2. Do problems 5.1.12, 5.1.14, 5.1.17, 5.1.19, 5.2.3, and 5.2.7.

3. Read Appendix D on the complex numbers. Then do the following exercises:

   - Let $z = 1 + i$ and $w = -4 + 3i$. Find $z + w$, zw, $\overline{z}$, and $\frac{1}{w}$, and $|z|$. Write both z and w in $re^{i\theta}$ notation, and plot both on the complex plane.

   - Prove Theorem D.2 parts (a), (d), and (e).

   - Show that the map

     $$S : \mathbb{C} \to \mathbb{C}$$
     $$z \mapsto \overline{z}$$

     is not a linear transformation ov $\mathbb{C}$ as a complex vector space (even though reflection across the x-axis is a linear transformation of $\mathbb{R}^2$).

   - Show that rotation of the plane by θ radians gives a linear transformation $T : \mathbb{C} \to \mathbb{C}$. Show this transformation is diagonalizable (even though the same rotation is not diagonalizable as a transformation on $\mathbb{R}^2$ unless θ is a multiple of π).