Homework 1 (due 2/7)

MAT 342: Applied Complex Analysis

Read all of Chapter 1 (Sections 1–12).

Problems from the textbook:
§2: 1, 4
§3: 1, 2, 4
§5: 1, 5, 8
§6: 1, 2, 14
§9: 1, 4, 5ac

Additional problems to hand in:

Problem 1. For each part of the problem justify all of your steps.

(a) If $z = x + iy$, write the following complex numbers in the form $u + iv$, where u and v are written in terms of x and y:

(i) $\frac{1}{z}$

(ii) $\mathrm{Re}\left(\frac{1}{z}\right)$

(iii) $\mathrm{Im}\left(\frac{1}{z}\right)$

(b) If $z_1 = x_1 + iy_1$ and $z_2 = x_2 + iy_2$, write $\frac{z_1}{z_2}$ in the form $u + iv$, where u and v are written in terms of x_1, y_1, x_2, y_2.

Problem 2. Using the properties of the modulus $|z|$ and of the conjugate $\overline{z}$ that we discussed in the lecture show that

$$\left|\frac{z_1}{z_2}\right| = \frac{|z_1|}{|z_2|}$$

for any complex numbers z_1, z_2. *Hint: Follow our proof of the equality* $|z_1 \cdot z_2| = |z_1| \cdot |z_2|$.