

Homework 1

Due Tuesday July 16

Chapter 1 Problems: 1.1(cd); 1.2(d); 1.3(c); 1.4(h); 1.5(c); 1.9; 1.11(c) and sketch the solutions; 1.10; 1.12; 1.13; 1.17; 1.23(adeh) (Briefly justify why your picture is correct); 1.25; 1.29; 1.33(abd)

Chapter 2 Problems: 2.1, 2.3, 2.5, 2.6, 2.9.

Additional Exercises

1. Let T be a triangle with vertices given by $0, 1, z$, where $z \in \mathbb{C}$. Let $w \in \mathbb{C}$. Show that the triangle wT with vertices $0, w, wz$ is similar to T .
2. Let $U \subset \mathbb{C}$ be a region. Show that any two points $z, w \in U$ can be connected by a path γ composed of the union of line segments. Show that the line segments may be taken to be only parallel to the real and imaginary axis. (HINT: You may assume that the path γ may be covered by finitely many open balls, each of which is contained inside of U).
3. Look at exercise 1.24 (you do not have to complete it). Discuss the following claim: If $p(z)$ is a polynomial with real coefficients, then the solutions to $p(z) = 0$ come in complex conjugate pairs. Is this claim true if $p(z)$ has complex coefficients?
4. Find an example of a function $f : \mathbb{R} \rightarrow \mathbb{R}$ that is differentiable, but f' is not continuous. Compare to Goursat's theorem (you may have to google this).