MATH 396T
HOMEWORK 2

SPRING 2020

The following assignment is to be turned in on
Monday, February 10th, 2020.

Reading:

- Chapter 1 (Notes): (pages 31-32)
- Section 2.1: (pages 33-34)
- Section 2.2: (pages 36-45)

Suggested Problems (not to be handed in):

- Section 2.1: 1, 4 e)
- Section 2.2: 1, 3

Homework (to be handed in):

- Section 1.4:
    Let $f : \mathbb{R} \to \mathbb{C}$ and $g : \mathbb{R} \to \mathbb{C}$ be complex-valued functions on $\mathbb{R}$ whose real and imaginary parts are differentiable. Show that the product rule still holds, i.e.
$$\frac{d}{dx}\left(f(x)g(x)\right) = \frac{d}{dx}\left(f(x)\right)g(x) + f(x)\frac{d}{dx}\left(g(x)\right)$$
- Section 1.4: 3 a), 6
- Section 2.1:
    Use induction to prove the following. For any $n \in \mathbb{N}$, let $f(z) = a_n z^n + \cdots a_1 z + a_0$ be a degree n polynomial. Prove that
$$-\frac{a_{n-1}}{a_n} = \sum_{k=1}^{n} z_k$$
    where $z_1, z_2, \cdots z_n$ are the n roots of f whose existence are guaranteed by the fundamental theorem of algebra.
- Section 2.1: 2, 4 d)
- Section 2.2: 2, 4, 5