Bilkent University

Homework # 02
Math 503 Complex Analysis I
Due: 25 October 2020
Instructor: Ali Sinan Sertöz

Name & Lastname: .....

Department: ..... Student ID: .....

Scan and save your answer as a pdf file and mail it to me before the deadline.

Q-1) Let $u(t)$, $v(t)$ be real valued continuous functions on the interval $[a, b]$, and let $f(t) = u(t) + iv(t)$. Let $K = \alpha + i\beta$, where α, β are some real numbers.

I: Show that

$$K \int_a^b f(t)\, dt = \int_a^b K f(t)\, dt.$$

II: Show that

$$\left| \int_a^b f(t)\, dt \right| \leq \int_a^b |f(t)\, dt| .$$

Q-2) Show by using only the definition of complex integrals that $\displaystyle\int_\gamma \frac{1}{z}\, dz = 2\pi i$, where γ is the unit circle centered at the origin and taken in the counterclockwise direction.