Bilkent University

Homework # 05
Math 503 Complex Analysis I
Due: 18 December 2020 Friday
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) Show that $\Gamma(z)$ never vanishes.

Q-2) Show that

$$\frac{\zeta'(z)}{\zeta(z)} = -\sum_{n=1}^{\infty} \frac{\Lambda(n)}{n^z}, \quad \text{for} \quad \operatorname{Re} z > 1,$$

where $\zeta(z)$ is the Riemann zeta function, and $\Lambda(n)$ is the Mangoldt function defined on positive integers as $\Lambda(n) = \log p$ if n is a power of the prime p, and is zero otherwise.