

7. Find the number of roots of the equation

$$z^6 - 5z^5 + 10 = 0$$

that are in the annulus $\{z : 1 < |z| < 2\}$.

8. Let $D = \{z : |z| < 1\}$. Find all Möbius (bilinear) transformations T such that $T(D) = D$.

9. Evaluate the following definite integral:

$$\int_{-\infty}^{\infty} \frac{\cos x}{a^2 + x^2} dx, \quad a > 0,$$

10. Evaluate the following definite integral:

$$\int_0^{\infty} \frac{x^{\alpha-1}}{1+x} dx, \quad 0 < \alpha < 1.$$