

# COMPLEX VARIABLES (MTH 204)

DR. SANJAY KUMAR SINGH

## ASSIGNMENT-2

SUBMISSION DATE: 21-01-2023

**Problem 1.** Solve problem 5 from Page-31, Section-(10-11), Chapter 1.

**Problem 2.** Solve problems 6,7,8,9 from Page-35, Section-(12), Chapter 1.

**Problem 3.** Find the four zeros of the polynomial  $z^4 + 4$ .

**Problem 4.** Solve the equation  $z^2 + z + 1 = 0$  for  $z = (x, y)$  by writing

$$(x, y)(x, y) + (x, y) + (1, 0) = (0, 0)$$

And then solving a pair of simultaneous equations in  $x$  and  $y$ .

**Problem 5.** Sketch the region onto which the sector  $r \leq 1, 0 \leq \theta \leq \frac{\pi}{4}$  is mapped by the transformation (a)  $w = z^2$ ; (c)  $w = z^3$ .

**Problem 6.** Find the image of the semi-infinite strip  $x \geq 0, 0 \leq y \leq \pi$  under the transformation  $w = \exp z$ , and label corresponding portions of the boundaries.

**Problem 7.** Using the definition of the limit show that  $\lim_{z \rightarrow 1-i} [x + i(2x + y)] = 1 + i$  ( $z = x + iy$ ).

**Problem 8.** Show that

$$\lim_{z \rightarrow \infty} \frac{4z^2}{(z-1)^2} = 4.$$

**Text Book:** R. V. Churchill and J. W. Brown, Complex variables and applications, McGraw-Hill, 2003, **9th Indian Edition**.

**Note:** Assignment submission is not compulsory. If you submit the assignment, Tutor will check it and mark your mistakes. It will be very helpful in the examination.