

## M598B: Hints for Homework Assignment 6

5. The reason that the negative  $x$ -axis is excluded is that the function  $f(z)$  is not continuous there if I include it in the domain.
6. Use definition to show that the function does not have derivative: select two paths for the limit, show the limits are different along these paths. You can pick up easy paths first.
7. You can use substitution  $r = z^2$  in the geometric series  $1/(1-r) = 1 + r + r^2 + \dots + r^n + \dots$ . Or you can try to use the formula mentioned in the lecture.
8. Use definition

$$\int_C z dz = \int_C (x + iy)(dx + idy) = \int_C (x dx - y dy) + i \int_C (x dy + y dx).$$

Then use  $y = x^2$  in the above and use the integral limits  $x = 1$  to  $x = 2$ .

9. Use one of the theorems listed in class. You do not need to prove that  $z^n$  is analytic for  $n > 0$ .
10. Note that the symbol  $|z - 1| = 1$  indicates the circle

$$(x - 1)^2 + y^2 = 1.$$

Then use the derivative formula derived from Cauchy integral formula for  $f(z) = 1$ ,  $z_0 = 1$ , and  $n = 1$ .