

Midterm Examination

Complex Analysis (Math 427)

Instructor: Jarod Alper

Fall 2018

November 2, 2018

Name: _____

Read all of the following information before starting the exam:

- You may refer to your hand-written note sheet (8.5" x 11", one-sided).
- You may not consult any other sources (calculator, phone, computer, textbook, other students, ...) to assist in answering the exam problems. All of the work will be your own!
- Write clearly!! You need to write your solutions carefully and clearly in order to convince me that your solution is correct. Partial credit will be awarded.
- Good luck!

Problem	Points
1 (30 points)	_____
2 (30 points)	_____
3 (40 points)	_____
Total (100 points)	

Problem 1 (30 points).

(a) For a positive integer n , define the complex number $z_n = 1/(n^2 + 2018i)$. Does the limit $\lim_{n \rightarrow \infty} z_n$ exist? If so, what is the limit?

(b) For which values of z does the series $\sum_{n=0}^{\infty} 1/(n+z)^2$ converge?

Problem 2 (30 points). Let $f(z) = 1/z$.

(a) Use the definition of the derivative to show that $f(z)$ is analytic on $\mathbb{C} \setminus 0$.

(b) Verify the Cauchy–Riemann equations for $f(z)$ on $\mathbb{C} \setminus 0$.

Problem 3 (40 points).

(a) Give a counterclockwise parameterization γ of a circle of radius 1 centered at $1 + i$.

(b) Compute

$$\int_{\gamma} \bar{z} dz.$$

(c) Compute the integral

$$\int_{\gamma} \frac{1}{z} dz.$$

