Math 120A **Midterm Exam 2 v. A** **Name:** _____
August 31, 2023 **(Total Points: *25*)** **PID:** _____

Instructions

1. **Write your Name and PID in the spaces provided above.**
2. **Complete the *Excel with Integrity Pledge* on the last page.**
3. **Make sure your Name is on every page and that your Integrity Pledge is completed correctly.**
4. **No calculators, tablets, phones, or other electronic devices are allowed during this exam.**
5. **Put away ANY devices that can be used for communication or can access the Internet.**
6. **You may use one handwritten page of notes, but no books or other assistance during this exam.**
7. **Read each question carefully and answer each question completely.**
8. **Write your solutions clearly in the spaces provided. Work on scratch paper will not be graded.**
9. **Show all of your work. No credit will be given for unsupported answers, even if correct.**

(1 point) 0. Carefully read and complete the instructions at the top of this exam sheet and any additional instructions written on the chalkboard during the exam.

(6 points) 1. Given $R > 0$, let $\gamma = \{z \in \mathbb{C} \mid |z| = R\}$ with positive (counterclockwise) orientation. Evaluate the following integrals.

(a) $\displaystyle\int_\gamma \left|\frac{1}{z^3}\right| dz$

(b) $\displaystyle\int_\gamma \left|\frac{1}{z^3}\right| |dz|$

(6 points) 2. Let $\gamma = \{z \in \mathbb{C} \mid |z| = 2\}$ with positive (counterclockwise) orientation. Use the Cauchy integral formula to evaluate the following integrals.

(a) $\displaystyle\int_\gamma \frac{\cos\left(\frac{\pi}{3}z\right)}{z-1}\,dz$

(b) $\displaystyle\int_\gamma \frac{e^{2z}}{z}\,dz$

(6 points) 3. Consider the function $f(z) = \dfrac{1}{z+1}$.

(a) Determine the power series expansion $\displaystyle\sum_{k=0}^{\infty} a_k (z-1)^k$ of $f(z)$ centered at $z_0 = 1$.

(b) What is the radius of convergence of the power series?

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(6 points) 4. Let $h(z) = \dfrac{1}{z^3} + \dfrac{1}{z^5}$.

(a) Determine the zeros of h and their orders.

(b) Determine if h is analytic at ∞ and, if so, determine the order of the zero at ∞.

Math 120A Excel with Integrity Pledge

The Excel with Integrity pledge affirms the UC San Diego commitment to excel with integrity both on and off campus, in academic, professional, and research endeavors.

According to the International Center for Academic Integrity, academic integrity means having the courage to act in ways that are honest, fair, responsible, respectful & trustworthy even when it is difficult. Creating work with integrity is important because otherwise we are misrepresenting our knowledge and abilities and the University is falsely certifying our accomplishments. And when this happens, the UCSD degree loses its value and we've all wasted our time and talents!

Name: _____ **PID:** _____

Excel with Integrity Pledge

*I am **fair** to my classmates and instructors by not using any unauthorized aids.*
*I **respect** myself and my university by upholding educational and evaluative goals.*
*I am **honest** in my representation of myself and of my work.*
*I accept **responsibility** for ensuring my actions are in accord with academic integrity.*
*I show that I am **trustworthy** even when no one is watching.*

Affirm your adherence to this pledge by writing the following statement in the space below:

I Excel with Integrity.

Signature: _____ **Date:** _____