

Instructions: Each group is assigned one problem. Within each group, you may work in teams but each of you must write and submit your own solutions. Violators may be penalized up to the maximum credit for the assignment. You must turn in your solutions as a scanned copy via email to amriksen@thapar.edu by 9 pm of April 26, 2020. Maximum credit for this assignment is five points.

1. **Group 1:**

$f(z) = \frac{z-5}{z \sin z}$. What type of singularity does $f(z)$ have? What is the strength of the pole of $f(z)$?

2. **Group 2:**

Let $f(z) = \frac{(z+2)}{z(z-1)^2}$. Compute the strength of the poles of $f(z)$.

3. **Group 3:**

Define the pole of a function $f(z)$. Define strength of the pole. How can you compute the strength of a pole of $f(z)$ by evaluating a related analytic function at the pole? Present your derivations.

4. **Group 4:**

Find the Taylor series of $f(z) = e^{z^2}$ in \mathbb{C} .

5. **Group 5:**

Laurent series and Taylor series are both power series representations of a function $f(z)$ near a point z_0 . If so, why do we need the former when we already have the more familiar Taylor series?

6. **Group 6:**

Find the Laurent series of $f(z) = \frac{1}{(z-1)(z-2)}$ for $1 < |z| < 2$. Show all steps.

□