Assignment #6

Due: Wednesday, April 23, noon

You are being evaluated on the presentation, as well as the correctness, of your answers. Try to answer questions in a clear, direct, and efficient way. Sloppy or incorrect use of technical terms will lower your mark.

1. Determine the order of the pole at z = 0.

(a)
$$f(z) = \frac{\cosh z}{z^3}$$
 (b) $f(z) = \frac{e^{4z} - 1}{\sin^2 z}$

- 2. Find and classify the isolated singularities:
- (a) $f(z) = \frac{1}{z(e^z 1)}$ (b) $g(z) = \frac{\sin z}{z^2 z}$ (c) $h(z) = \frac{\tan z}{z}$

3. Let C be the circle |z| = 5 with positive orientation. Evaluate the following integrals:

(a)
$$\oint_C \sin\left(\frac{1}{z}\right) dz$$
 (b) $\oint_C z \sin\left(\frac{1}{z}\right) dz$ (c) $\oint_C z^2 \sin\left(\frac{1}{z}\right) dz$

4. Compute Res (f; 0)

(a)
$$f(z) = z^2 e^{1/z}$$
 (b) $f(z) = \frac{1+e^z}{1-e^z}$ (c) $f(z) = \frac{e^z - 1}{\sin z}$