

NAME:

Worksheet Week X

The following functions have isolated singular points. Determine whether they are a removable singularity, an essential singularity or a pole. In the case of a pole, find the corresponding residue.

(a) $f(z) = \frac{z^2}{1+z}$.

(b) $g(z) = z \exp\left(\frac{1}{z}\right)$.

(c) $h(z) = \frac{z+1}{z^2+9}$.

(d) $p(z) = \csc(z)$.

- (e) Residues can be used to evaluate integrals over the real numbers. Find the value of

$$\int_0^{\infty} \frac{1}{x^4 + 1} dx.$$