The following function f has an isolated singularity at z=0. Its nature: it is a pole; find the singular part.

 $f\left(z\right)=\frac{z^{2}+1}{z(z-1)}$

Use this equation and definition:

Equation: $f\left(z\right)= \frac{A\_{m}}{\left(z-a\right)^{m}}+…+ \frac{A\_{1}}{\left(z-a\right)}+g\_{1}(z)$ (\*)

Where $g\_{1}$ is analytic in $B\left(a;R\right)$ and $A\_{m}\ne 0$.

Definition: if f has a pole of order m at z=0 and satisfies (\*) then $A\_{m}\left(z-a\right)^{-m}+…+A\_{1}\left(z-a\right)^{-1}$ is called the singular part of f at z-a.