1. Find and classify the isolated singularities of the function

\[ f(z) = \frac{e^{1/z} - e}{z - 1} + \frac{1}{\sin z}. \]

2. Let \( \gamma(t) = 3e^{it}, \) \( 0 \leq t \leq 2\pi. \) Compute the integrals

\[
\int_{\gamma} \tan z \, dz,
\]

\[
\int_{\gamma} \frac{1}{\sin z \cos z} \, dz
\]

3. Use Rouché’s theorem to find the number of solutions of \( z^5 + 3z^2 + 1 = 0 \)
in the set \( A = \{ z \mid 1 \leq |z| \leq 2 \}. \)