1. (20 marks) Consider the function

\[ f(z) := \frac{z^2 + z + 1}{(z - 3)(z^2 - 7z + 12)}. \]

Expand \( f \) in a Taylor series, centred at the origin, in the disc \( D(0; 3) \).

2. Consider the function

\[ g(z) := \frac{z}{z^2 + 1}. \]

(i) (10 marks) Expand \( g \) in a Laurent series, centred at \( i \), in the punctured disc \( D^*(i; 2) \).

(ii) (10 marks) Expand \( g \) in a Laurent series, centred at \( -i \), in the annular region

\[ A := \{ z \in \mathbb{C} : 2 < |z + i| < \infty \}. \]