
Homework 13
Due: Friday, December 1

1. [BC] 56.6.
2. Let $f(z) = \frac{1}{z-z^3}$.
 - (a) Find a Laurent series expansion for f which is valid on $0 < |z| < 1$.
 - (b) Find a Laurent series expansion for f which is valid on $1 < |z|$.

3. [BC] 64.2.

4. [BC] 64.4.

5. Suppose that P is a polynomial

$$P(z) = \lambda(z - z_1)(z - z_2) \cdots (z - z_n).$$

(By the fundamental theorem of algebra, *any* polynomial can be written like this.)

Let C be a simple, closed contour which does not pass through any of the z_1, \dots, z_n .

What is

$$\frac{1}{2\pi i} \int_C \frac{P'(z)}{P(z)} dz?$$

(HINT: *The answer depends on the choice of contour, C and on the z_1, \dots, z_n . You may want to look again at Homework 5, Problem 5.*)