All curves are positively oriented unless otherwise noted.

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1. Find all the Laurent series (in all annuli defined by the singularities of the functions) around the point z_0 given.

$(a)\ f(z)=\dfrac{1}{1-z}, z_0=0, \quad (b)\ f(z)=\dfrac{1}{1-z}, z_0=2, \quad (c)\ f(z)=e^{1/z}, z_0=0, \quad (d)\ f(z)=\dfrac{z}{(z-1)(z-3)}, z_0=1.$

2. Suppose you have the Laurent expansion

$$f(z)=\sum_{n=-\infty}^{\infty} a_n z^n, \quad (r<|z|<R).$$

Find the Laurent expansion of the function

$$g(z)=(az^2+bz+c)f(z).$$