



$$a_n = \frac{1}{2\pi i} \oint_C \frac{f(\zeta)}{(\zeta - p)^{n+1}} d\zeta, \quad f(\zeta) = \frac{\zeta - p}{\zeta - q}.$$

$$f(z) = \frac{z - p}{z - q}, \quad \text{ord}_p f = \frac{1}{2\pi i} \oint_{\partial D_\varepsilon(p)} \frac{df}{f} = +1, \quad \text{ord}_q f = \frac{1}{2\pi i} \oint_{\partial D_\varepsilon(q)} \frac{df}{f} = -1. \quad \text{At } z=0: \quad a_1 = f'(p) = \frac{1}{2\pi i} \oint_C \frac{f(\zeta)}{(\zeta - p)^2} d\zeta = \frac{1}{p - q}, \quad a_{n \geq 2} = 0.$$

$$\Rightarrow \#Z - \#P = 1 - 1 = 0.$$

$$\text{wind}(f(C), 0) = \#Z_C - \#P_C = 1 - 1 = 0 \Rightarrow \oint_C \frac{f'(z)}{f(z)} dz = 0.$$