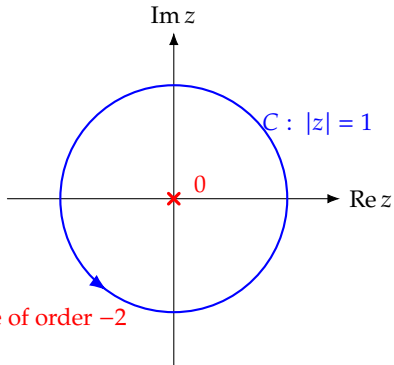
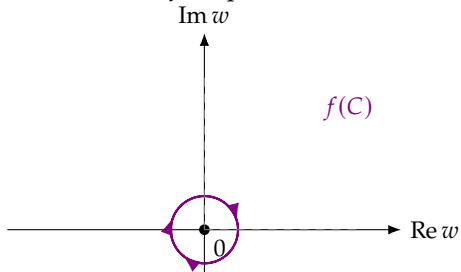


z-plane



$$f(z) = \frac{1}{z^2}, \quad \text{ord}_0 f = \frac{1}{2\pi i} \oint_C \frac{df}{f} = \frac{1}{2\pi i} \oint_C \frac{-2 dz}{z} = -2.$$

$w = f(z)$ -plane



$$f(z) = \frac{1}{z^2} = \sum_{n=-\infty}^{\infty} c_n z^n, \quad c_n = \frac{1}{2\pi i} \oint_C \frac{f(\zeta)}{\zeta^{n+1}} d\zeta.$$

$$\text{For } f(z) = 1/z^2: \quad c_{-2} = 1 \quad (= \frac{1}{2\pi i} \oint_C \frac{1}{\zeta} d\zeta), \quad c_n = 0 \quad (n \neq -2).$$

$$\text{wind}(f(C), 0) = -2 \Rightarrow \oint_C \frac{f'(z)}{f(z)} dz = -2\pi i \cdot 2.$$