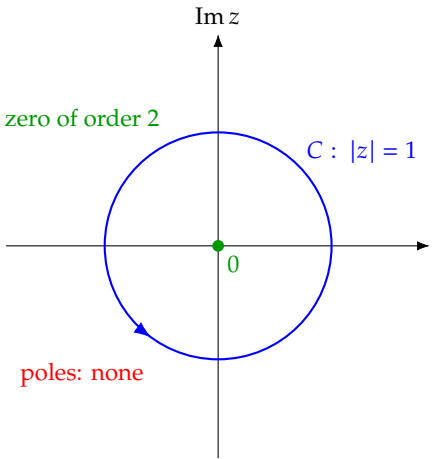

$$f(z) = z^2$$

$$\oint_C \mathrm{Im}\left(\frac{df}{f}\right) = \oint_C \mathrm{Im}\left(\frac{2\,dz}{z}\right) = 2\pi \cdot 2$$

$$a_0 = f(0) = \frac{1}{2\pi i}\oint_C \frac{f(\zeta)}{\zeta}\,d\zeta = 0$$

$$a_1 = f'(0) = \frac{1}{2\pi i}\oint_C \frac{f(\zeta)}{\zeta^2}\,d\zeta = 0,$$

$$a_2 = \frac{f''(0)}{2!} = \frac{1}{2\pi i}\oint_C \frac{f(\zeta)}{\zeta^3}\,d\zeta = \frac{1}{2\pi i}\oint_C \frac{1}{\zeta}\,d\zeta = 1.$$

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