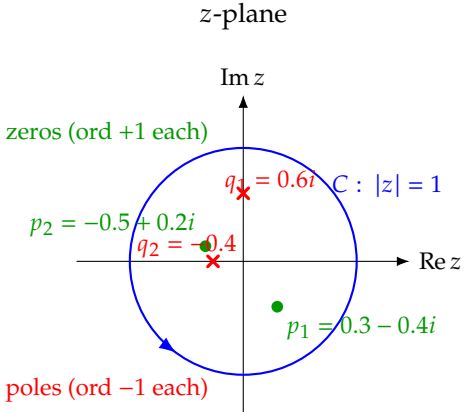

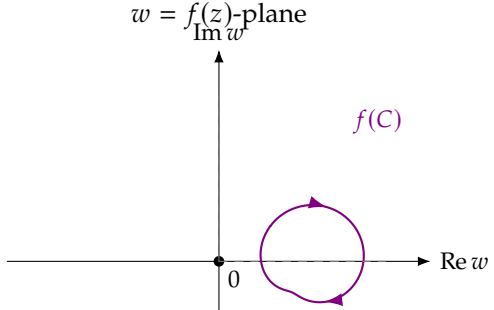

$$f(z) = \frac{(z-p_1)(z-p_2)}{(z-q_1)(z-q_2)}, \qquad \frac{df}{f} = \frac{dz}{z-p_1} + \frac{dz}{z-p_2} - \frac{dz}{z-q_1} - \frac{dz}{z-q_2}.$$

$$\operatorname{ord}_{p_1} f = \operatorname{ord}_{p_2} f = +1, \quad \operatorname{ord}_{q_1} f = \operatorname{ord}_{q_2} f = -1 \;\Rightarrow\; \#Z - \#P = 2 - 2 = 0.$$

$$a_n = \frac{1}{2\pi i}\oint_C \frac{f(\zeta)}{(\zeta-p_1)^{n+1}}\,d\zeta, \qquad f(\zeta) = \frac{(\zeta-p_1)(\zeta-p_2)}{(\zeta-q_1)(\zeta-q_2)}.$$

At $z_0 = p_1$: $a_0 = f(p_1) = 0$, $\quad a_1 = f'(p_1) = \dfrac{p_1-p_2}{(p_1-q_1)(p_1-q_2)}$,

$$a_2 = \frac{1}{2}f''(p_1) = \frac{1}{2}\left(\frac{d}{dz}\,\frac{z-p_2}{(z-q_1)(z-q_2)}\right)\Bigg|_{z=p_1} = \frac{(p_1-q_1)(p_1-q_2) - (p_1-p_2)\,[\,2p_1-(q_1+q_2)\,]}{2\,(p_1-q_1)^2(p_1-q_2)^2}.$$

$$\operatorname{wind}\big(f(C),0\big) = \#Z_C - \#P_C = 2-2 = 0 \;\Rightarrow\; \oint_C \frac{f'(z)}{f(z)}\,dz = 0.$$