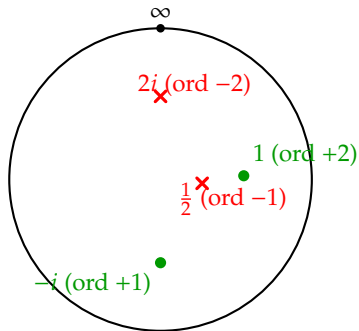
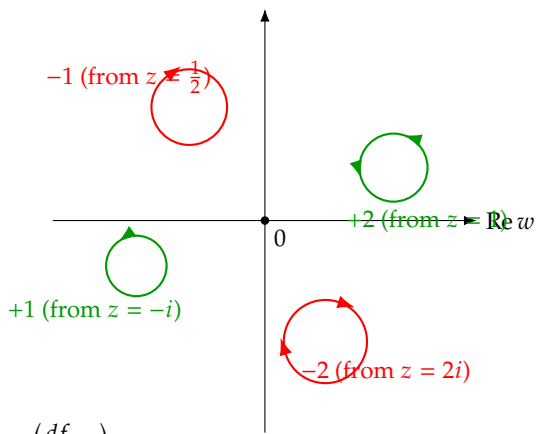


Riemann sphere $\widehat{\mathbb{C}}$ (domain)



w -plane (local images near punctures)



$$f(z) = \frac{(z-1)^2(z+i)}{(z-\frac{1}{2})(z-2i)^2}$$

$$d\left(\frac{df}{f}\right) = 0 \text{ off the punctures} \Rightarrow 0 = \int_{\partial(\widehat{\mathbb{C}} \setminus \cup D_\varepsilon)} \frac{df}{f} = - \sum_p \int_{\partial D_\varepsilon(p)} \frac{df}{f} = - \sum_p \text{Res}\left(\frac{df}{f}, p\right) = 2\pi i (2 + 1 - 1 - 2) = 0 \Rightarrow \sum_p \text{ord}_p f = 0.$$