

Hassani
10.32

By Cauchy integral formula $\left(f(z_0) = \oint_C \frac{1}{2\pi i} \frac{f(\xi) d\xi}{\xi - z_0} \right)$,

we have $\oint_C \frac{f'(z) dz}{z - z_0} = f'(z_0) \times (2\pi i)$

$$f'(z_0) = f'(z) \Big|_{z=z_0}$$

$$f'(z) = \frac{1}{2\pi i} \oint_C \frac{f(\xi) d\xi}{(\xi - z)^2}$$

$$\Rightarrow f'(z) \Big|_{z=z_0} = \frac{1}{2\pi i} \oint_C \frac{f(\xi) d\xi}{(\xi - z_0)^2}$$

$$\Rightarrow (2\pi i) \times f'(z_0) = \oint_C \frac{f'(z) dz}{z - z_0} = \oint_C \frac{f(\xi) d\xi}{(\xi - z_0)^2}$$

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