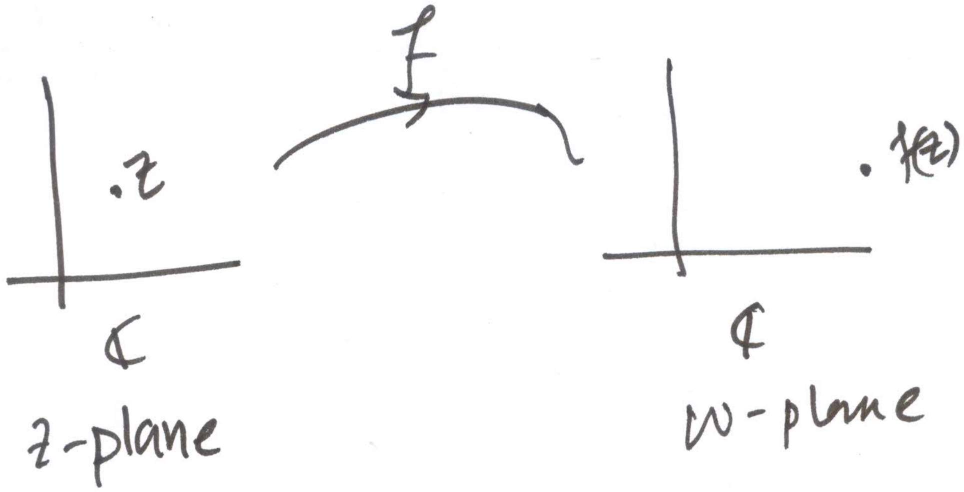
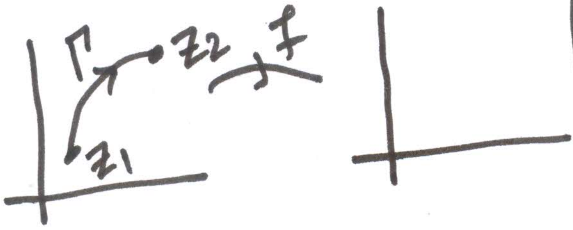
Lec-22



Complex Integration.

LINE Integration



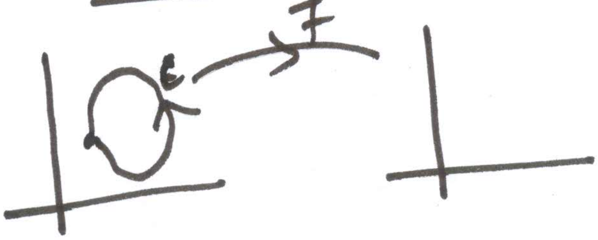
$$\int_\Gamma f(z)\,dz$$

Trick: parametrization of Γ (either given / find out)

$$= \int_{t=t_0}^{t_1} f(z(t))\, z'(t)\, dt$$ where $z(t)=\Gamma(t)$, $t_0 \le t \le t_1$

Check

Contour Integration

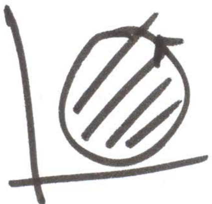


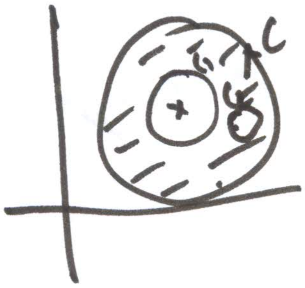
$$\oint_C f(z)\,dz$$

Trick Look at the domain where the fn f is analytic

→ simply connected

→ multiply connected



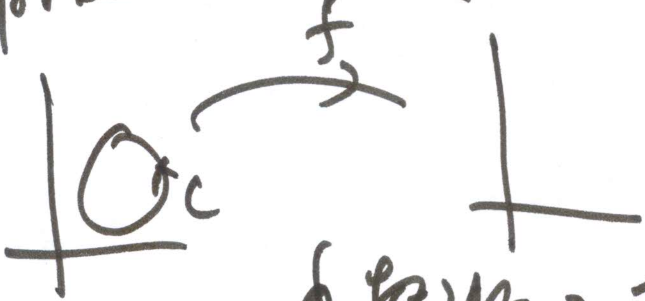


Cauchy

$$\oint_C f(z)\,dz = 0$$

Cauchy's Integral Formula (CIF)

The value of an analytic fn. f at any point z_0 in a simply connected domain can be represented by a contour integral.



$$\oint_c f(z)\,dz = f(z_0) \;??$$

Formula. Let f be an analytic fn on a simply connected domain D and C be any (simply closed) contour lying entirely within D. Then for any point z_0 within C,

$$f(z_0) = \frac{1}{2\pi i}\oint_C \frac{f(z)}{z-z_0}\,dz.$$