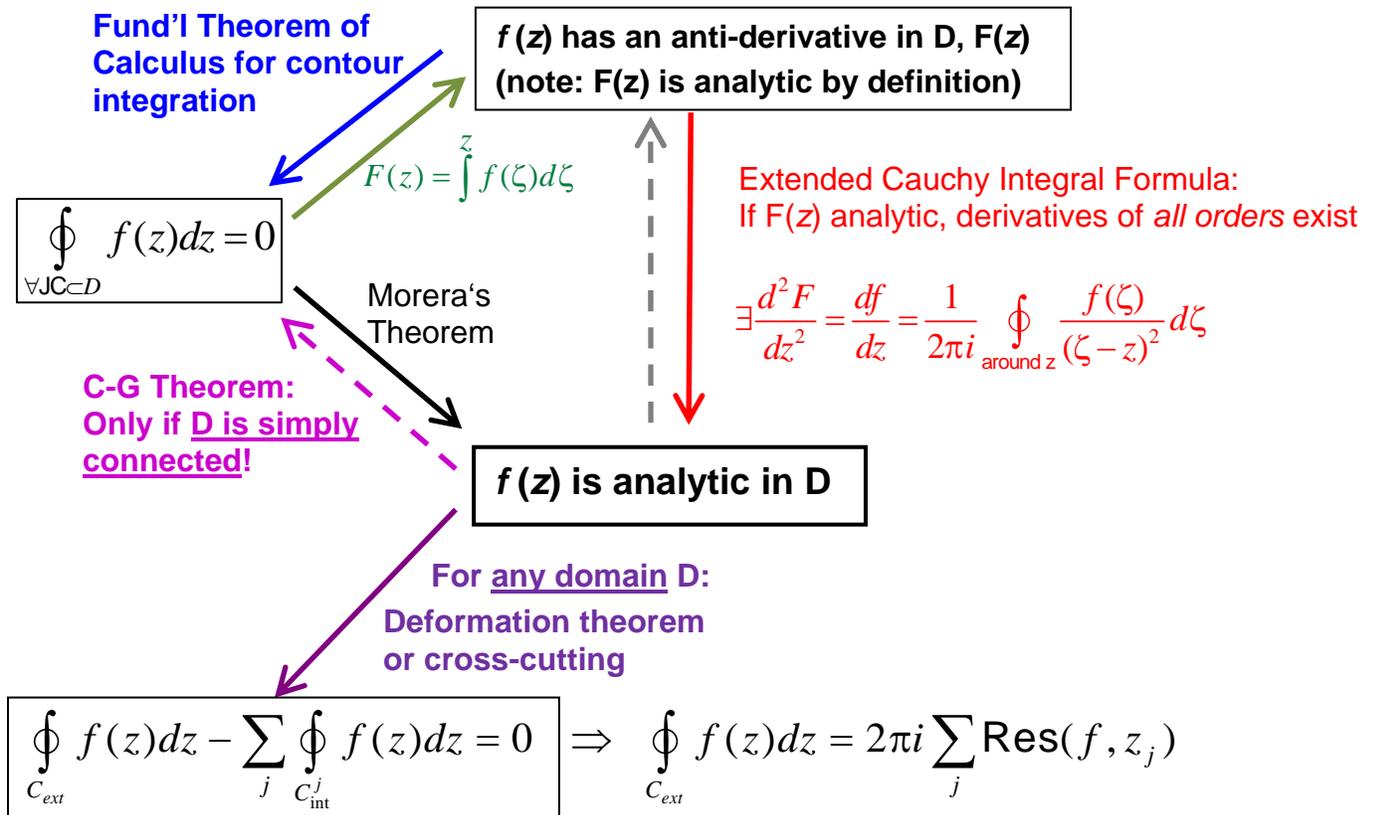


Contour Integral Theorems

Suppose $f(z)$ is continuous in domain (connected open set) D



Generalized contour integral over total boundary of non simply-connected domain of analyticity = 0

“Practical” corollaries of above theorems for evaluating an integral over a given simple closed contour (Jordan contour, JC):

1. **JC integral = 0** if integrand has an anti-derivative along entire contour
2. **JC integral = 0** if integrand is analytic inside and on the contour
3. **Use Cauchy Integral Formula** for pole singularity inside the contour:

$$\oint_{\text{around } z_0} \frac{f(z)}{(z - z_0)^{n+1}} dz = \frac{2\pi i}{n!} f^{(n)}(z_0)$$

4. **Use Residues** for any number of isolated singularities within the contour
5. **If none of the above applies**, use contour parametrization (direct integration)