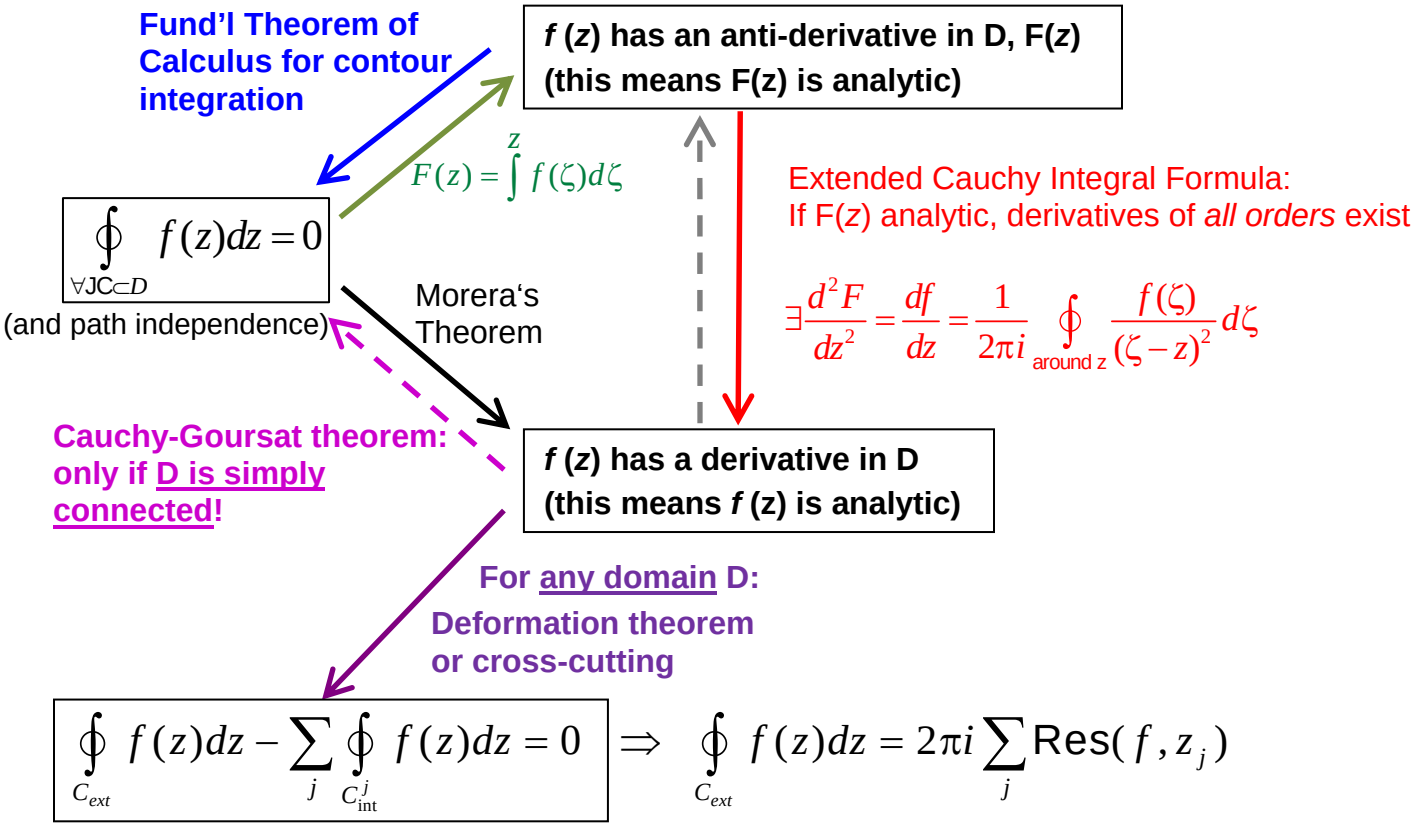
Contour Integral Theorems

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)**