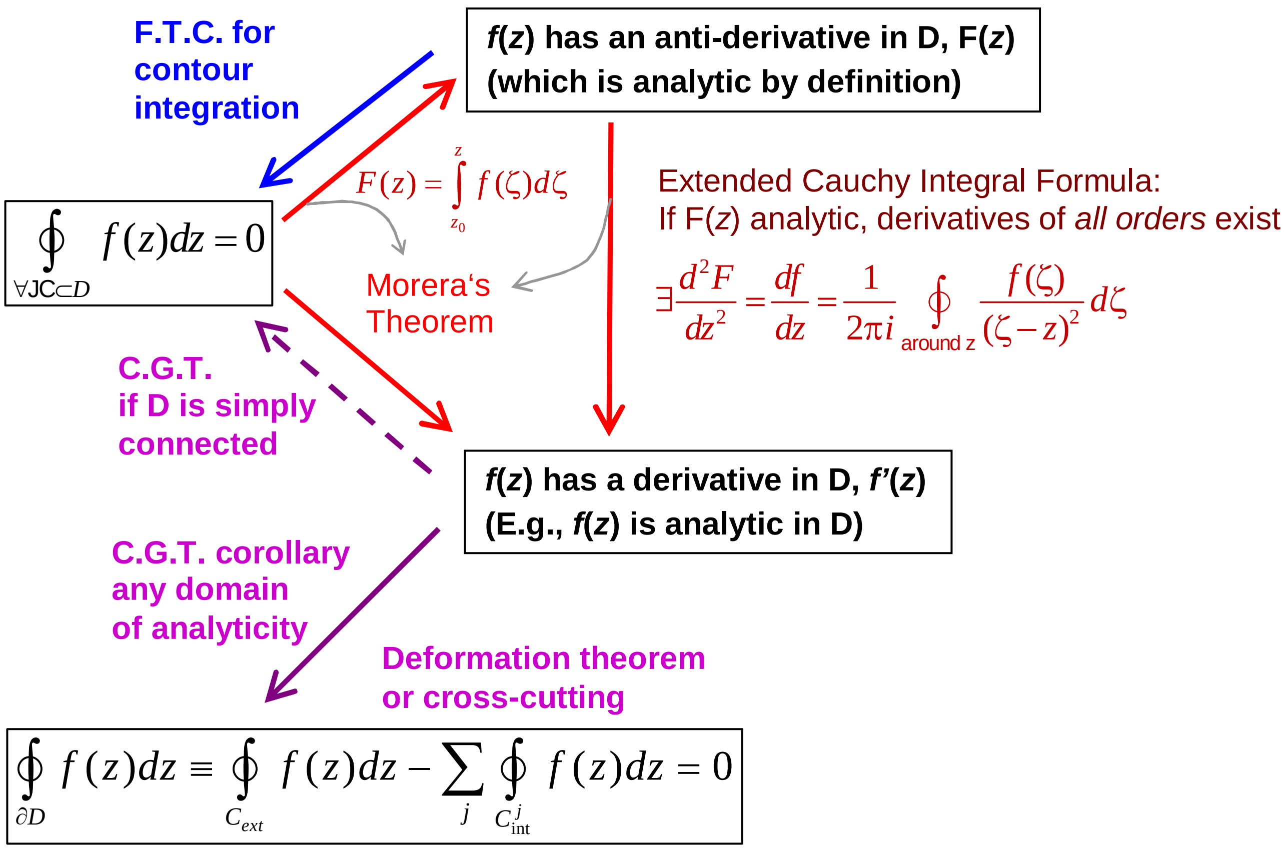
Contour Integral Theorems

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



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

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"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. **Otherwise, C.I.F. can be used if there are only pole (powers of $1/(z-z_0)$) singularities inside the contour:** $f^{(n)}(z_0) = \frac{n!}{2\pi i} \oint_{\text{around } z_0} \frac{f(z)}{(z-z_0)^{n+1}} dz$

(If none of above helps, use anti-derivative difference or contour parametrization)