

# Comparison of Integration Theorems

Assume that  $C, C_1, C_2$  are closed curves,  $D$  is a domain, and  $f : \mathbb{C} \rightarrow \mathbb{C}$  is defined on  $C, C_1, C_2$ , and  $D$ .

Theorem	Hypotheses					Conclusion
	$f$ continuous	$f$ analytic	$C$ simple	$D$ simply cncd	$\int_C f(z)dz = 0$	
Antiderivative	✓	✗	✗	✗	✗	$f$ has an antiderivative in $D \iff$ integrals in $D$ are path independent $\iff \int_C f(z)dz = 0 \forall C \subseteq D$
Cauchy-Goursat	(✓)	✓ (on/in $C$ )	✓	(✓)	[Conclusion]	$\int_C f(z)dz = 0 (\forall C)$
C-G Corollary	(✓)	✓	✗	✓	[Conclusion]	$\int_C f(z)dz = 0 (\forall C)$
Deformation Principle	(✓)	✓ (on/btwn $C_1, C_2$ )	✓	✗	✗	$\int_{C_1} f(z)dz = \int_{C_2} f(z)dz$
Morera's	✓	[Conclusion]	✗	✗	✓ ( $\forall C$ )	$f$ is analytic on $D$
Morera Corollary	✓	[Conclusion]	✗	✓	✓ ( $\forall C$ )	$f$ is analytic on $D$