THEOREM 2 on PAGE 754

When a differentiable function $f(x)$ has a POWER SERIES REPRESENTATION WITH RADIUS OF CONVERGENCE R,

THEN

Its Derivative $f'(x)$ and its integral $\int f(x)dx$ will also have POWER SERIES REPRESENTATIONS WITH RADIUS OF CONVERGENCE R (ALTHOUGH THE INTERVALS OF CONVERGENCE MAY DIFFER AT THE ENDPOINTS).

THESE POWER SERIES REPRESENTATIONS WILL HAVE THE SAME RADIUS OF CONVERGENCE R and THESE NEW POWER SERIES REPRESENTATIONS ARE OBTAINED FROM THE ORIGINAL POWER SERIES REPRESENTATION for $f(x)$ by "TERM-BY-TERM" Differentiation OR by "TERM-BY-TERM" Integration.

THUS, when $f(x) = \sum_{n=0}^{\infty} c_n x^n$ with Radius R,

Then, $f'(x) = \sum_{n=0}^{\infty} n \cdot c_n x^{n-1}$ with Radius R

and $\int f(x)dx = \sum_{n=0}^{\infty} \frac{c_n}{n+1} x^{(n+1)} + C$

with Radius R.