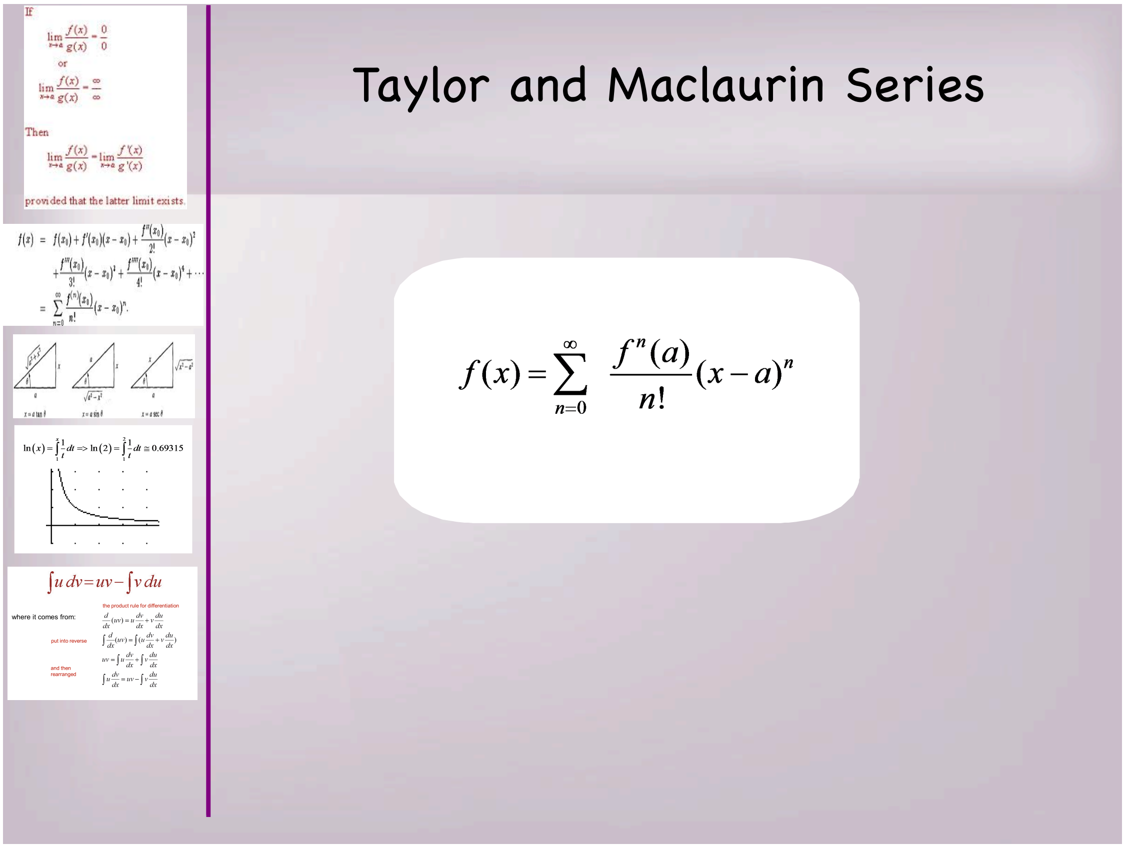

Taylor and Maclaurin Series

If we represent some function f(x) as a power series in (x-a), then

Uniqueness Theorem

Suppose

for every x in some interval around a.

Then .

Taylor's Formula with Remainder

Let $f(x)$ be a function such that $f^{(n+1)}(x)$ exists for all x on an open interval containing a.

Then, for every x in the interval,

where $R_n(x)$ is the remainder (or error).

Taylor's Theorem

Let f be a function with all derivatives in $(a-r,a+r)$.

The Taylor Series

represents $f(x)$ on $(a-r,a+r)$

if and only if

.

EX 1 Find the Maclaurin series for $f(x)=\cos x$ and prove it represents $\cos x$ for all x.

EX 2 Find the Maclaurin series for $f(x) = \sin x$.

EX 3 Write the Taylor series for $f(x) = \frac{1}{x}$ centered at $a=1$.

EX 4 Find the Taylor series for $f(x) = \sin x$ in $(x-\pi/4)$.

EX 5 Use what we already know to write a Maclaurin series (5 terms)

for .