Math 1220 #25
Taylor and Maclaurin Series

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