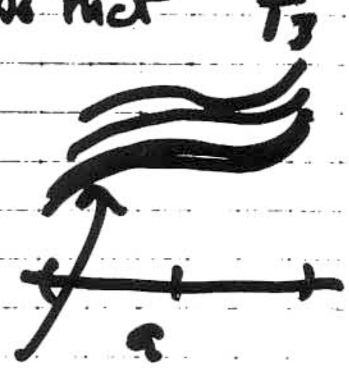
If there is a positive number r so that

$$\lim_{N\to\infty} \sum_{k=0}^{N} \frac{f^{(k)}(a)}{k!}(x-a)^k = f(x)$$



for $a-r<x<a+r$,

then f is called <u>analytic at the point</u> $x=a$.

Then the infinite series

$$\sum_{0}^{\infty} \frac{f^{(k)}(a)}{k!}(x-a)^k$$

is called <u>Taylor's Series</u> for the function f centered at $x=a$.

In the special case that $a=0$, the series becomes

$$\sum_{k=0}^{\infty} \frac{f^{(k)}(0)}{k!}x^k,$$

which is called a <u>Maclaurin Series</u>.

$f(x)=e^x \quad f^{(k)}(x)=e^x \quad f^{(k)}(0)=1$

$$\sum_{k=0}^{\infty} \frac{1}{k!}x^k = e^x$$