SE LIVE

SNS COLLEGE OF ENGINEERING

Kurumbapalayam (Po), Coimbatore – 641 107





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$$(x-1)(x-a) = 0$$

$$x = 1/2$$

$$(x-2) = |1-2| = |-1| = 1/2/2$$

$$(x-2) = |2-2| = 0 \le 1/2$$

$$(x-2) = |2-2| = 0 \le 1/2$$

$$(x-1)(x-2)^2 = \int \frac{x}{(x-2)^2} dx$$

Taylori Sories:

$$f(x) = f(a) + (x-a) \frac{f'(a)}{f(a)} + (x-a)^2 \frac{2!}{f''(a)} + \cdots$$

This is known as Taylor's series q = (x) at x = a.

Maclaurins Bories:

Put a = 0 in the Taylor series for f(x) then $f(x) = f(0) + \frac{1}{1!}(0) + \frac{1}{2!}(0) + \frac{1}{2!}(0) + \frac{1}{3!}(0) + \frac{1}{3!}(0)$ This series is called backwith

This series is called Maclawini series 9 1(x).

Problems :

1) Expand f(x) = 8in x in a Taylor series about x = 0.

Function

At
$$x = 0$$

$$\begin{cases}
(x) = 8 \text{ in } x & \begin{cases}
(0) = 0 \\
\end{cases} & \begin{cases}
(x) = 0 \text{ in } x
\end{cases} & \begin{cases}
(0) = 0
\end{cases} \\
\begin{cases}
(x) = -8 \text{ in } x
\end{cases} & \begin{cases}
(0) = 0
\end{cases} \\
\end{cases}$$

$$\begin{cases}
(x) = -6 \text{ in } x
\end{cases} & \begin{cases}
(0) = 0
\end{cases} \\
\end{cases}$$

$$\begin{cases}
(x) = -6 \text{ in } x
\end{cases} & \begin{cases}
(0) = 0
\end{cases} \\
\end{cases}$$

$$\begin{cases}
(x) = -6 \text{ in } x
\end{cases} & \begin{cases}
(0) = 0
\end{cases} \\
\end{cases}$$

$$\begin{cases}
(x) = -6 \text{ in } x
\end{cases} & \begin{cases}
(0) = 0
\end{cases} \\
\end{cases}$$

$$\begin{cases}
(x) = -6 \text{ in } x
\end{cases} & \begin{cases}
(0) = 0
\end{cases} \\
\end{cases}$$

STATION.

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Taylor sories about
$$x = 0$$

$$f(x) = f(0) + \frac{f'(0)}{1!} x + \frac{f''(0)}{2!} x^2 + \frac{f'''(0)}{3!} x^3 + \cdots$$

$$= 0 + \frac{1 \cdot x}{1!} + \frac{0 \cdot x^2}{2!} + \frac{(-1) \cdot x^3}{3!} + 0 + \cdots$$

$$= \frac{x}{1!} - \frac{x^3}{3!} + \cdots$$

3) Expand $\frac{x-1}{x+1}$ in Taylor sories about the point x=1.

80tn :

Function At
$$x = 1$$

$$f(x) = \frac{x-1}{x+1} \qquad f(1) = 0$$

$$f'(x) = \frac{(x+1)^2}{(x+1)^2}$$

$$f'(1) = \sqrt{2}$$

$$\int_{1} (x) = \frac{(x+1)_{3}}{(x+1)_{3}} \qquad \int_{1} (1) = -\sqrt{3}$$

$$\frac{1}{2}$$
"(x) = $\frac{12}{(x+1)^4}$ $\frac{1}{2}$ "(1) = 8/4

Taylor sories about x = 1

$$\frac{1}{2}(x) = \frac{1}{2}(1) + (x-1)\frac{1}{2}\frac{1}{2}(1) + \frac{(x-1)^2}{2!}\frac{1}{2}(1) + \dots$$

$$= 0 + \frac{(x-1)}{1!}\left(\frac{1}{2}\right) + \frac{(x-1)^2}{2}\left(-\frac{1}{2}\right) + \frac{(x-1)^3}{6}\left(\frac{8}{4}\right) + \dots$$

$$= \frac{x-1}{2} - \frac{(x-1)^2}{4} + \frac{(x-1)^3}{8} + \dots$$
3) Expand for (1+x) as a $x = 1$

3) Expand log (1+x) as a Taylori series about z=0.

Function At
$$x = 0$$
.

 $f(x) = \log (1+x)$
 $f(0) = \log 1 = 0$
 $f'(x) = \frac{1}{1+x}$
 $f'(0) = 1$.

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$$\begin{cases}
\frac{1}{1}(x) = \frac{(1+x)^{2}}{2} & \frac{1}{1}(0) = -6 \\
\frac{1}{1}(x) = \frac{(1+x)^{2}}{2} & \frac{1}{1}(0) = -6
\end{cases}$$

Taylor's series about x = 0

$$\frac{1}{1}(x) = \frac{1}{1}(0) + \frac{1$$

Laurenti Bories :

Let circa be two concentric circles 12-a1= R, and

| x-a | = Ra where Ra LRI.

Let 1000 be analytic on ciscs and in the annular

region R. Then
$$f(x) = \sum_{n=0}^{\infty} \alpha_n (x-\alpha)^n + \sum_{n=1}^{\infty} \frac{b_n}{(x-\alpha)^n}$$
where $\alpha_n = \frac{1}{2\pi i} \int_{C_1} \frac{f(x)}{(x-\alpha)^{1+n}} dx$

$$b_n = \frac{1}{2\pi i} \int_{C_2} \frac{f(x)}{(x-\alpha)^{1-n}} dx$$

Problems :

1) Find the Laurenti' series expansion q $f(x) = \frac{1}{(x-1)(x-2)}$ valid in the region

(i) | 4 | x | 2 (ii) | x | > 2 and 0 2 | x - 1 | 4 | .

Given, $f(x) = \frac{1}{(x-1)(x-2)}$

$$\frac{1}{(x-1)(x-2)} = \frac{A}{x-1} + \frac{B}{x-2} = \frac{A(x-2) + B(x-1)}{(x-1)(x-2)}$$

$$1 = A(x-2) + B(x-1)$$