Maclaurin Polynomial (degree 5) for $f(x) = e^x$

$c = 0$

$$f(x) \approx P_5(x) = a_0 + a_1 x + a_2 x^2 + a_3 x^3 + a_4 x^4 + a_5 x^5$$

$$a_n = \frac{f^{(n)}(0)}{n!},$$

$$a_n = \frac{1}{n!}$$

$$\cancel{P_3(x) = 1 + x + \frac{x^2}{2} + \frac{x^3}{3!} + x^4}$$

n	$f^{n}(x)$	$f^{n}(0)$
0	e^x	1
1	e^x	1
2	e^x	1
$\vdots$	$\vdots$	
n	e^x	1

$$\boxed{P_5(x) = 1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \frac{x^4}{4!} + \frac{x^5}{5!}}$$

Maclaurin Series for e^x

$$e^x = 1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \cdots + \frac{x^n}{n!} + \cdots = \sum_{n=0}^{\infty} \frac{x^n}{n!}$$

Larson 9.7.17 5th deg. maclaurin Poly. for $\sin(x)$

$$\sin x \approx a_0 + a_1 x + a_2 x^2 + a_3 x^3 + a_4 x^4 + a_5 x^5$$

where $a_n = \dfrac{f^{(n)}(0)}{n!}$, $a_0 = 0$, $a_1 = \frac{1}{1!}$, $a_2 = 0$, $a_3 = \frac{-1}{3!}$, $a_4 = 0$, $a_5 \frac{1}{5!}$

n	$f^{(n)}(x)$	$f^{(n)}(0)$
0	$\sin x$	0
1	$\cos x$	1
2	$-\sin x$	0
3	$-\cos x$	-1
4	$\sin x$	0
5	$\cos x$	1

$$\boxed{\sin x \approx P_5(x) = x - \frac{x^3}{3!} + \frac{x^5}{5!}}$$

Maclaurin Series for Sin(x)

$$\sin x = x + \frac{x^3}{3!} + \frac{x^5}{5!} - \frac{x^7}{7!} \cdots + \frac{(-1)^n x^{2n+1}}{(2n+1)!} + \cdots$$

$$\sin x = \sum_{n=0}^{\infty} \frac{(-1)^n x^{2n+1}}{(2n+1)!}$$