Math 143: Calculus III

Common Taylor Series

Common Taylor series centered at $x = 0$:

Function	Taylor Series	Initial Terms	Converges for
$\dfrac{1}{1-x}$	$\sum_{n=0}^{\infty} x^n$	$1 + x + x^2 + x^3 + x^4 + \cdots$	$-1 < x < 1$
$\dfrac{1}{1+x}$	$\sum_{n=0}^{\infty} (-1)^n x^n$	$1 - x + x^2 - x^3 + x^4 - \cdots$	$-1 < x < 1$
e^x	$\sum_{n=0}^{\infty} \dfrac{x^n}{n!}$	$1 + x + \dfrac{x^2}{2!} + \dfrac{x^3}{3!} + \dfrac{x^4}{4!} + \cdots$	All x
$\sin(x)$	$\sum_{n=0}^{\infty} \dfrac{(-1)^n}{(2n+1)!} x^{2n+1}$	$x - \dfrac{x^3}{3!} + \dfrac{x^5}{5!} - \dfrac{x^7}{7!} + \cdots$	All x
$\cos(x)$	$\sum_{n=0}^{\infty} \dfrac{(-1)^n}{(2n)!} x^{2n}$	$1 - \dfrac{x^2}{2!} + \dfrac{x^4}{4!} - \dfrac{x^6}{6!} + \cdots$	All x
$\tan^{-1}(x)$	$\sum_{n=0}^{\infty} \dfrac{(-1)^n}{2n+1} x^{2n+1}$	$x - \dfrac{x^3}{3} + \dfrac{x^5}{5} - \dfrac{x^7}{7} + \cdots$	$-1 \leq x \leq 1$
$\ln(1+x)$	$\sum_{n=1}^{\infty} \dfrac{(-1)^{n-1}}{n} x^n$	$x - \dfrac{x^2}{2} + \dfrac{x^3}{3} - \dfrac{x^4}{4} + \cdots$	$-1 < x \leq 1$