Power Series to Memorize

Function	Kayla-Kalynda Notation	Interval of Convergence	Summation Notation	Comment
$\mathbf{\frac{1}{1-x}}$	$1 + x + x^2 + x^3 + x^4 + \cdots$	$(-1, 1)$	$\sum_{k=0}^{\infty} (x^k)$	
$\boldsymbol{e^x}$	$1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \frac{x^4}{4!} + \cdots$	$(-\infty, \infty)$	$\sum_{k=0}^{\infty} \left(\frac{x^k}{k!}\right)$	
$\mathbf{ln(1+}\boldsymbol{x}\mathbf{)}$	$x - \frac{x^2}{2} + \frac{x^3}{3} - \frac{x^4}{4} + \cdots$	$(-1, 1]$	$\sum_{k=1}^{\infty} \left[(-1)^{(k-1)} \left(\frac{x^k}{k}\right)\right]$	
$\mathbf{cos}\,\boldsymbol{x}$	$1 - \frac{x^2}{2!} + \frac{x^4}{4!} - \frac{x^6}{6!} + \cdots$	$(-\infty, \infty)$	$\sum_{k=0}^{\infty} \left[(-1)^{(k)} \left(\frac{x^{(2k)}}{(2k)!}\right)\right]$	Even function
$\mathbf{sin}\,\boldsymbol{x}$	$x - \frac{x^3}{3!} + \frac{x^5}{5!} - \frac{x^7}{7!} + \cdots$	$(-\infty, \infty)$	$\sum_{k=1}^{\infty} \left[(-1)^{(k-1)} \left(\frac{x^{(2k-1)}}{(2k-1)!}\right)\right]$	Odd function
$\mathbf{tan^{-1}}\,\boldsymbol{x}$	$x - \frac{x^3}{3} + \frac{x^5}{5} - \frac{x^7}{7} + \cdots$	$[-1, 1]$	$\sum_{k=1}^{\infty} \left[(-1)^{(k-1)} \left(\frac{x^{(2k-1)}}{(2k-1)}\right)\right]$	Odd function

Things to notice:

- Series beginning with "$1 +$" have summations beginning with $k = 0$"; those beginning with "$x +$" have summations beginning with $k = 1$".
- $e^x, \cos x, \sin x$ have intervals of convergence $(-\infty, \infty)$; the others have versions of $(-1, 1)$, with <u>different</u> endpoints included.
- The top three series contain every power of x (except x^0 for $\ln(1 + x)$); the bottom three have only even or odd powers of x.

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$\frac{1}{1-x}$				
e^x				
$\ln(1+x)$				
$\cos x$				
$\sin x$				
$\tan^{-1} x$				

My thoughts: