

**Flash Cards for MacLaurin/Taylor Series    Math 121**

$e^x = \sum_{n=0}^{\infty} \frac{x^n}{n!}$ $= 1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \frac{x^4}{4!} + \frac{x^5}{5!} + \dots$ <p style="text-align: center;">Interval of Convergence    <math>I = (-\infty, \infty)</math></p> <p style="text-align: center;">Radius of Convergence    <math>R = \infty</math></p>	$\sin x = \sum_{n=0}^{\infty} \frac{(-1)^n x^{2n+1}}{(2n+1)!}$ $= x - \frac{x^3}{3!} + \frac{x^5}{5!} - \frac{x^7}{7!} + \frac{x^9}{9!} + \dots$ <p style="text-align: center;">Interval of Convergence    <math>I = (-\infty, \infty)</math></p> <p style="text-align: center;">Radius of Convergence    <math>R = \infty</math></p>
$\frac{1}{1-x} = \sum_{n=0}^{\infty} x^n$ $= 1 + x + x^2 + x^3 + x^4 + x^5 + \dots$ <p style="text-align: center;">Interval of Convergence    <math>I = (-1, 1)</math></p> <p style="text-align: center;">Radius of Convergence    <math>R = 1</math></p>	$\cos x = \sum_{n=0}^{\infty} \frac{(-1)^n x^{2n}}{(2n)!}$ $= 1 - \frac{x^2}{2!} + \frac{x^4}{4!} - \frac{x^6}{6!} + \frac{x^8}{8!} + \dots$ <p style="text-align: center;">Interval of Convergence    <math>I = (-\infty, \infty)</math></p> <p style="text-align: center;">Radius of Convergence    <math>R = \infty</math></p>
$\arctan x = \sum_{n=0}^{\infty} \frac{(-1)^n x^{2n+1}}{2n+1} \quad (\text{how?})$ $= x - \frac{x^3}{3} + \frac{x^5}{5} - \frac{x^7}{7} + \frac{x^9}{9} + \dots$ <p style="text-align: center;">Interval of Convergence    <math>I = [-1, 1]</math></p> <p style="text-align: center;">Radius of Convergence    <math>R = 1</math></p>	$\ln(1+x) = \sum_{n=0}^{\infty} \frac{(-1)^n x^{n+1}}{n+1} \quad (\text{how?})$ $= x - \frac{x^2}{2} + \frac{x^3}{3} - \frac{x^4}{4} + \frac{x^5}{5} + \dots$ <p style="text-align: center;">Interval of Convergence    <math>I = (-1, 1]</math></p> <p style="text-align: center;">Radius of Convergence    <math>R = 1</math></p>
<p><b>Taylor Series</b> for <math>f</math> at <math>a</math></p> $\sum_{n=0}^{\infty} \frac{f^{(n)}(a)}{n!} (x-a)^n \quad \text{for }  x-a  < R$ $= f(a) + f'(a)(x-a) + \frac{f''(a)}{2!}(x-a)^2 + \dots$	<p><b>MacLaurin Series</b> for <math>f</math> at <math>a = 0</math></p> $\sum_{n=0}^{\infty} \frac{f^{(n)}(0)}{n!} x^n \quad \text{for }  x  < R$ $= f(0) + f'(0)x + \frac{f''(0)}{2!}x^2 + \frac{f'''(0)}{3!}x^3 + \dots$