	6. Given the series $\sum_{n=0}^{\infty}\frac{x^n}{n!}$ answer the following questions. a. List the first 6 terms of the series and the general term $\sum_{n=0}^{\infty}\frac{x^n}{n!}=$ b. Use the Ratio Test to determine the Interval of Convergence of the series. c. Enter the first 6 terms into y_1 of your calculator. Use $X[-3,3]_1$ and $Y[0,10]$ as your window. d. What function does it look like the series represents? That function is the sum of this series. f. Take the derivative of $\sum_{n=0}^{\infty}\frac{x^n}{n!}=1+x+\frac{x^2}{2!}+\frac{x^3}{3!}+\cdots+\frac{x^n}{n!}+\cdots=e^x$ g. Take the anti-derivative of $\sum_{n=0}^{\infty}\frac{x^n}{n!}=1+x+\frac{x^2}{2!}+\frac{x^3}{3!}+\cdots+\frac{x^n}{n!}+\cdots=e^x$

7. Given the series $\sum_{n=1}^{\infty}(-1)^{n-1}\frac{x^n}{n}$ answer the following questions.

a. List the first 6 terms of the series and the general term

$$\sum_{n=1}^{\infty}(-1)^{n-1}\frac{x^n}{n}=$$

b. Use the Ratio Test to determine the Interval of Convergence of the series. Don't forget to test your endpoints.

$$\lim_{n\to\infty}\left|\frac{(-1)^n x^{n+1}}{n}\cdot\frac{n}{(-1)^{n-1}x^n}\right| = |x| < 1 \qquad \boxed{-1 < x \le 1}$$

$$x=-1 \quad \sum_{n=1}^{\infty}\frac{(-1)^{n-1}(-1)^n}{n}=\frac{(-1)^{2n-1}}{n}$$

$$x=1 \quad \sum\frac{(-1)^{n-1}}{n}$$

c. Enter the first 6 terms into y_1 of your calculator. Use your interval of convergence for your x window and Y[-2,2] as your window.

d. What function does it look like the series represents? That function is the sum of this series.

f. Take the derivative of $\sum_{n=1}^{\infty}(-1)^{n-1}\frac{x^n}{n}=x-\frac{x^2}{2}+\frac{x^3}{3}-\cdots+(-1)^{n-1}\frac{x^n}{n}+\cdots=\ln(1+x)$

g. Compare your derivative in part f to the series you wrote in problem 2a.

h. Take the anti-derivative of

$$\sum_{n=1}^{\infty}(-1)^{n-1}\frac{x^n}{n}=x-\frac{x^2}{2}+\frac{x^3}{3}-\cdots+(-1)^{n-1}\frac{x^n}{n}+\cdots=\ln(1+x)$$

8. Given the series $\sum_{n=0}^{\infty}(-1)^n \frac{x^{2n+1}}{2n+1}$ answer the following questions.

a. List the first 6 terms of the series and the general term

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

b. Use the Ratio Test to determine the Interval of Convergence of the series. Don't forget to test your endpoints.

c. Enter the first 6 terms into y_1 of your calculator. Use your interval of convergence for your x window and $Y\left[\frac{-\pi}{2},\frac{\pi}{2}\right]$ as your window.

d. What function does it look like the series represents? That function is the sum of this series.

f. Take the derivative of

$$\sum_{n=0}^{\infty}(-1)^n \frac{x^{2n+1}}{2n+1} = x - \frac{x^3}{3} + \frac{x^5}{5} - \cdots + (-1)^n \frac{x^{2n+1}}{2n+1} + \cdots = \arctan(x)$$

g. Compare your derivative in part f to the series you wrote in problem 3a.

h. Take the anti-derivative of $\sum_{n=0}^{\infty}(-1)^n \frac{x^{2n+1}}{2n+1} = x - \frac{x^3}{3} + \frac{x^5}{5} - \cdots + (-1)^n \frac{x^{2n+1}}{2n+1} + \cdots =$

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

1. Find the first 4 terms of the series 2. Write the rule for the series 3. Find the interval of convergence 4. Take the derivative of the function and series 5. Take the anti-derivative of the function and the series	5) $f(x)= x^2e^{x^3}$ replace x with x^3 $e^{x^3} = 1 + (x^3) + \frac{(x^3)^2}{2!} + \frac{(x^3)^3}{3!} + \cdots \frac{(x^3)^n}{n!} =$ $e^{x^3} = 1 + x^3 + \frac{x^6}{2!} + \frac{x^9}{3!} + \cdots \frac{(x^{3n})}{n!} = \sum_{n=0}^{\infty} \frac{x^{3n}}{n!}$ $f(x) = x^2 e^{x^2} = x^2 + x^5 + \frac{x^8}{2!} + \frac{x^{11}}{3!} + \cdots \frac{x^{3n+2}}{n!}$ 6) $f(x)= xe^{x^4}$

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

$10n+5$

1. Find the first 4 terms of the series 2. Write the rule for the series 3. Find the interval of convergence 4. Take the derivative of the function and series 5. Take the anti-derivative of the function and the series	7) $f(x)=x^2\tan^{-1}(x^5)$ $\arctan(x^5) = x^5 - \frac{x^{15}}{3} + \frac{x^{25}}{5} + \cdots \frac{(-1)^n x^{5(2n+1)}}{(2n+1)}$ $f(x) = x^2 \arctan(x^5) = x^7 - \frac{x^{17}}{3} + \frac{x^{27}}{5} + \cdots \frac{(-1)^n x^{10n+7}}{(2n+1)}$ $\ln(1+x) = x - \frac{x^2}{2} + \frac{x^3}{3} - \frac{x^4}{4} + \cdots \frac{(-1)^{n-1} x^n}{n}$ 8) $f(x)=\ln(1-x^4)$ $f(x) = (-x)^4 - \frac{(-x^4)^2}{2} + \frac{(-x^4)^3}{3} - \frac{(-x^4)^4}{4} + \cdots \frac{(-1)^{n-1}(-x^4)^n}{n}$ $= -x^4 - \frac{x^8}{2} - \frac{x^{12}}{3} - \frac{x^{16}}{4} + \cdots \frac{(-1)^{n-1}(-x^{4n})}{n}$

	Construct the first 3 nonzero terms and the general term of the Maclaurin Series generated by the function and give the interval of convergence. A) $f(x) = e^{5x}$ B) $f(x) = \ln(1+2x)$ C) $f(x) = \dfrac{1}{x+5}$