$$Sum = \frac{1^{st}\ term}{1 - r}$$

	Find the interval of Convergence and the function that represents the series

24) $\sum_{n=0}^{\infty} \frac{(x+1)^{2n}}{9^n} =$

$$r = \frac{(x+1)^2}{9}$$

$$-1 < \frac{(x+1)^2}{9} < 1$$

$$-9 < (x+1)^2 < 9$$

$$-3 < x+1 < 3$$

$$-1 \quad\quad -1 \quad\quad -1$$

$$-4 < x < 2$$

$$S = \frac{1}{1 - \frac{(x+1)^2}{9}}$$

28) $\sum_{n=0}^{\infty} \left(\frac{\sin x}{2}\right)^n =$

What you'll Learn About
Testing Endpoints for Convergece

Find the interval of convergence

24) $\sum_{n=0}^{\infty}\left(\frac{2}{3}\right)^n(x-1)^n =$

$r = \frac{2}{3}(x-1)$

$-1 < \frac{2}{3}(x-1) < 1$

$-\frac{3}{2} < x-1 < \frac{3}{2}$

$-\frac{1}{2} < x < \frac{5}{2}$

$x = -\frac{1}{2}$

$\sum_{n=0}^{\infty}\left(\frac{2}{3}\right)^n\left(-\frac{3}{2}\right)^n = \sum_{n=0}^{\infty}(-1)^n$ $\quad \lim_{n\to\infty}\left|(-1)^n\right| \neq 0$ diverges

$x = \frac{5}{2}$

$\sum_{n=0}^{\infty}\left(\frac{2}{3}\right)^n\left(\frac{3}{2}\right)^n = \sum_{n=0}^{\infty}(1)^n$ $\quad \lim_{n\to\infty}(1)^n \neq 0$ diverges

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

$\lim_{n\to\infty}\left|\frac{(-1)^{n+1}(3x-1)^{n+1}}{(n+1)^2}\cdot\frac{n^2}{(-1)^n(3x-1)^n}\right| = \left|\frac{(3x-1)n^2}{(n+1)^2}\right| = |3x-1| < 1$

$-1 < 3x-1 < 1$

$0 < 3x < 2$

$\boxed{0 \le x \le \frac{2}{3}}$

Absolute Convergence

$x = 0$

$\sum_{n=0}^{\infty}\frac{(-1)^n(-1)^n}{n^2} = \sum_{n=0}^{\infty}\frac{(1)^n}{n^2} = \sum_{n=0}^{\infty}\frac{1}{n^2}$ $\quad p = 2 > 1$ converges

$x = \frac{2}{3}$

$\sum_{n=0}^{\infty}\frac{(-1)^n}{n^2}$ ~~conditional convergence b/c the series alternate and the terms decrease in absolute value~~

Absolute convergence $\to \sum_{1}^{\infty}\frac{1}{n^2}$ $\quad p = 2 > 1$

$-1 < x < 1 \rightarrow$ Interval

$\lim_{n\to\infty}\left|\frac{(-1)^n}{\sqrt{n}}\right| = 0 \quad \left|\frac{(-1)^{n+1}}{\sqrt{n+1}}\right| < \left|\frac{(-1)^n}{\sqrt{n}}\right|$

$-1 \leq x < 1$

$x = -1$
conditional convergence

Absolute Converges
$-1 < x < 1$
Conditional convergence
$x = -1$

9) $\boxed{\sum_{n=0}^{\infty} \frac{x^n}{\sqrt{n}} =}$

$\lim_{n\to\infty}\left|\frac{x^{n+1}}{\sqrt{n+1}} \cdot \frac{\sqrt{n}}{x^n}\right| = \left|\frac{x\sqrt{n}}{\sqrt{n+1}}\right| = |x| < 1$

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

conditional convergence b/c the series alternates and the absolute value of the terms approach 0.

Absolute? No
$\sum \frac{1}{\sqrt{n}} \quad p = \frac{1}{2} < 1$

$x = 1$
$\sum_{n=0}^{\infty} \frac{1}{\sqrt{n}} \rightarrow p = \frac{1}{2} \leq 1$ diverges

13) $\sum_{n=0}^{\infty} \frac{n!}{2^n} x^{2n} =$

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

	2015 AP Calculus BC Free Response 6. The Maclaurin Series for a function f is given by $\sum_{n=1}^{\infty} \frac{(-3)^{n-1}}{n} x^n = x - \frac{3}{2}x^2 + 3x^3 - \cdots + \frac{(-3)^{n-1}}{n} x^n + \cdots$ and converges to f(x) for $\lvert x \rvert < R$, where R is the radius of convergence of the Maclaurin series. a) Use the Ratio Test to find R. 20. What are all values of x for which the series $\sum_{n=1}^{\infty} \frac{(x-2)^n}{n3^n}$ converges? (A) $-3 \leq x \leq 3$ (B) $-3 < x < 3$ (C) $-1 < x \leq 5$ (D) $-1 \leq x \leq 5$ (E) $-1 \leq x < 5$