Determine which value the series converges to. (Determine the value of the series/Determine the sum of the series)

$$A) \sum_{n=0}^{\infty} \left(\frac{4}{5}\right)^{n} = 1 + \frac{4}{5} + \left(\frac{4}{5}\right)^{2} + \cdots \qquad B\left(\sum_{n=0}^{\infty} \frac{5^{n}}{n!}\right) = 1 + \frac{5}{1} + \frac{5^{2}}{2!} + \frac{5}{3}$$

$$B\left(\sum_{n=0}^{\infty} \frac{5^n}{n!}\right) = 1 + \frac{5}{1} + \frac{5^2}{2!} + \frac{5}{3!}$$

$$f(x) = \frac{1}{-\frac{4}{5}} = 5$$

$$\sum_{n=0}^{\infty} \frac{5^n}{n!} = e^5$$

$$\sum_{n=0}^{\infty} \frac{x^n}{n!} = e^x$$

C)
$$\sum_{n=0}^{\infty} \frac{(-1)^n \left(\frac{\pi}{4}\right)^{2n+1}}{(2n+1)!} = \sin\left(\frac{\pi}{4}\right) \quad D) \sum_{n=0}^{\infty} \frac{(-1)^n \left(\frac{1}{2}\right)^{2n+1}}{2n+1} = \frac{\sqrt{2}}{2}$$

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

CALCULUS: Graphical, Numerical, Algebraic by Finney, Demana, Watts and Kennedy Chapter 9: MaClaurin Series

What you'll Learn About Taking derivatives and anti-derivatives of a power series

- 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 series
 - 5. Take the antiderivative of the series

Geometric Series

1)
$$f(x) = \frac{1}{1+x^3}$$

$$r = x^2$$

2)
$$f(x) = \frac{x}{1-x^2} = x + x^3 + x^5 + x^7 + \dots + x^{2n+1} = \sum_{n=0}^{\infty} x^{2n+1}$$

$$\frac{d}{dx} \sum_{n=0}^{\infty} \chi^{2n+1} = \sum_{n=0}^{\infty} (2n+1) \chi^{2n}$$

$$\int \sum_{n=0}^{\infty} \chi^{2n+1} = \sum_{n=0}^{\infty} \frac{\chi^{2n+2}}{2n+2}$$

$$\int \sum_{n=0}^{\infty} \chi^{2n+1} = \sum_{n=0}^{\infty} \frac{\chi^{2n+2}}{2n+2}$$

 Write the rule for the series Find the interval of convergence Take the derivative of the series Take the antiderivative of the series 	te	rms	of	the s	rst 4 series	S
of convergence 4. Take the derivative of the series 5. Take the anti- derivative of the		for	the	ser	ies	
series 5. Take the anti- derivative of the		of c	onv	erge	nce	•
derivative of the	C	deri		100	the	
series			vativ	re of		
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$$3) f(x) = \sin(x^2)$$

4)
$$f(x) = x^{2} \cos(x^{3})$$

$$\cos(x) = \left| -\frac{x^{2}}{2!} + \frac{x^{4}}{4!} - \frac{x^{6}}{6!} + \dots - \frac{(-1)^{n} x^{2n}}{(2n)!} + \dots - \frac{(-1)^{n} x^{2n}}{(2n)!} \right|$$

$$\cos(x^{3}) = \left| -\frac{(x^{3})^{2}}{2!} + \frac{(x^{3})^{4}}{4!} - \frac{(x^{3})^{4}}{6!} + \dots - \frac{(-1)^{n} (x^{3})^{2n}}{(2n)!} \right|$$

$$\cos(x^{3}) = \left| -\frac{x^{6}}{2!} + \frac{x^{12}}{4!} - \frac{x^{18}}{6!} + \dots - \frac{(-1)^{n} x^{6n}}{(2n)!} \right|$$

$$x^{2} \cos(x^{3}) = x^{2} - \frac{x^{9}}{4!} + \frac{x^{14}}{4!} - \frac{x^{20}}{6!} + \dots - \frac{(-1)^{n} x^{6n+2}}{(2n)!}$$

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$$x^{2} \cos(x^{3}) = x^{2} - \frac{x^{18}}{4!} - \frac{x^{18}}{6!} + \dots - \frac{(-1)^{n} x^{6n+2}}{(2n)!}$$

$$\int \sum_{n=0}^{\infty} \frac{(-1)^n x^{6n+2}}{(2n)!} = \sum_{n=0}^{60} \frac{(-1)^n x^{6n+3}}{(6n+3)(2n)!} + C$$