Taylor and Maclaurin Series: Examples

SYMPLIT

1. Find the Maclaurin series for the function $f(x) = \dfrac{1}{3^x}$ and find the associated radius of convergence.

2. Find the Maclaurin series for the function $f(x) = x \sin x$ and find the associated radius of convergence.

3. Find the Taylor series for the function $f(x) = \ln(x+1)$ centered at $a = 2$ and find the associated radius of convergence.

4. Find the Taylor series for the function $f(x) = \sqrt[3]{x}$ centered at $a = 8$ and find the associated radius of convergence.

5. Use the binomial series to expand the function $f(x) = \sqrt{4-x}$ as a power of x and find the radius of convergence.

6. Find the Maclaurin series for the function $f(x) = x^2 \sin(3x)$ and find the associated radius of convergence.

7. Find the Maclaurin series for the function $f(x) = \cos^2(5x)$.

8. Use multiplication or division of power series to find the first 3 nonzero terms in the Maclaurin series for $f(x) = e^{2x} \sin x$

9. Find the sum of the series $\displaystyle\sum_{n=1}^{\infty} (-1)^{n-1} \frac{(\frac{1}{e} - 1)^n}{n}$

10. Find the sum of the series $\displaystyle\sum_{n=0}^{\infty} \frac{(-9)^n}{(2n)!}$

11. Find the sum of the series $\displaystyle\sum_{n=1}^{\infty} \frac{2^n}{3^n n!}$

12. Use series to evaluate: $\displaystyle\lim_{x \to 0} \frac{1 - \frac{1}{2}x^2 - \cos x}{x^4}$.

13. If $f(x) = x^3 \cos x$, find the 100th derivative evaluated at zero; i.e. find $f^{(100)}(0)$.

14. If $f(x) = x \sin x$, find $f^{(100)}(0)$