DoNow

1. Does the Maclaurin series for $\cos(x)$ at $x = 1$ converge conditionally or absolutely? Explain.
2. Does the Maclaurin series for $\ln(1+x)$ at $x = 1$ converge conditionally or absolutely? Explain.

From Yesterday for the Board

4. Without consulting your notes, demonstrate how to find the first 4 non-zero terms of the Maclaurin series for:

   (a) e^x (d) $\dfrac{1}{1-x}$ (g) $\dfrac{1}{1+x^2}$

   (b) $\sin(x)$ (e) $\dfrac{1}{1+x}$ (h) $\arctan(x)$

   (c) $\cos(x)$ (f) $\ln(1+x)$

5. These are converging Maclaurin series. For each series:
   - Write the k^{th} term.
   - Identify the function.
   - Identify the value of x.
   - Find the sum.

   (a) $1+1+\dfrac{1}{2!}+\dfrac{1}{3!}+\dfrac{1}{4!}+\ldots$

   (b) $1-\dfrac{1}{3}+\dfrac{1}{3^2}-\dfrac{1}{3^3}+\ldots$

   (c) $\dfrac{1}{2!}-\dfrac{1}{3!}+\dfrac{1}{4!}-\dfrac{1}{5!}+\ldots$

   (d) $1-\dfrac{1}{2}+\dfrac{1}{3}-\dfrac{1}{4}+\ldots$

   (e) $1-\dfrac{1}{3!}+\dfrac{1}{5!}-\dfrac{1}{7!}+\ldots$

   (f) $1-\dfrac{1}{3}+\dfrac{1}{5}-\dfrac{1}{7}+\ldots$

New Questions

6. For what values of x does

$$\sum_{k=1}^{\infty} \frac{kx^k}{3^k}$$

converge. Explain your reasoning.

7. How many terms of the Maclaurin series for $\ln(1+x)$ are needed to estimate $\ln(1.5)$ to within 0.0001?

8. Find the Taylor series for $f(x) = \ln(x)$ when $a = 1$.

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