Powerful Series of Power Series (Lecture Assignment)

Complete this assignment and submit it to Gradescope by 4:00pm on your class day. You can print this sheet, or write on your own paper. Contact us if internet connections or other issues require alternate arrangements.

Find a power series representation, and its radius of convergence, for the following functions:

1. $f(x) = \dfrac{1}{8+x^3}$. *Hint: rewrite $f(x)$ to match the formula of the sum of a geometric series.*

$= \dfrac{\frac{1}{8}}{1-(-\frac{x^3}{8})}$ $\quad \left|\dfrac{x^3}{8}\right| < 1$

$= \sum_{n=0}^{\infty} \frac{1}{8}\left(-\frac{x^3}{8}\right)^n$ $\quad |x| < 2$

$R = 2$

2. $g(x) = \dfrac{x^2}{8+x^3}$

$\left|\frac{x^3}{8}\right| < 1$

$= \dfrac{\frac{x^2}{8}}{1-(-\frac{x^3}{8})}$ $\quad |x| < 2$

$= \sum_{n=0}^{\infty} \frac{x^2}{8}\left(-\frac{x^3}{8}\right)^n$ $\quad r = 2$

3. $g'(x) = \dfrac{16x - x^4}{(8+x^3)^2}$ $\rightarrow$ $16x + 2x^4 - 3x^2$

$g(x) = \dfrac{x^2}{8+x^3}$

$= \text{see}$

$= \sum_{n=0}^{\infty} \frac{x^2}{8}\left(-\frac{x^3}{8}\right)^n$ $\rightarrow R = 2$

One-Minute Questions: Write a sentence for each.

A. What's one mathematical question you have after watching the videos?

Not from videos, but still unclear on distinction between geometric & power series.

B. What's one interesting thing you learned from the book or videos?

I didn't know that you could integrate / differentiate power series