Math 199 CD3 Merit Worksheet 22: Review for Last Midterm: I SWEAR MY QUESTION IS THE EASY ONE. I PROMISE!!!!!! AND I LIKE POLYNOMIAL AND POWER SERIES TOO MUCH. NOTHING IS WRONG WITH THAT

April 14, 2022

1 Determine Radius of Convergence

Calculate R, the radius of convergence. If the radius of convergence is infinity, explain why

1. $\sum_{n=1}^{\infty}(-1)^n \frac{9n^6x^n}{72^n}$

2. $\sum_{n=1}^{\infty}(-1)^n \frac{10n^6x^n}{200^n}$

3. $\sum_{n=1}^{\infty}(-1)^n \frac{10n^6x^n}{C^n}$ where C is just any constant. Do you realize something special?

4. For the following problems, write down the Maclaurin series about 0 and decide the interval of convergence, radius of convergence and whether the end points are included in the interval of convergence. Binomial Series would be helpful here. I would need you to at least write down the first 3 terms of the binomial coefficients

   (a) $(1+5x)^{1/2}$

   (b) $(10+6x)^{1/2}$

   (c) $(1+3x)^{1/4}$

2 Calculate the terms of expansion

1. Find the first 3 terms Maclaurin series for $f(x) = \sin^2 x$ about $\pi/4$

2. Find the first 3 terms Maclaurin series for $f(x) = \frac{x}{\sqrt{1-x^2}}$

3. Find the first 3 non-zero terms of the Maclaurin series for xe^{-x}

3 Taylor Series

4. Let $f(x) = x^3 \cos(x^3)$. What is $f^{(21)}(0)$

5. Let $f(x) = x^{10} \cos(x^4)$. What is $f^{(18)}(0)$ The key here is to not actually do 18 and 21 derivative

4 Other helpful problems

I can't cover everything, but I highly recommend going through both merit and class worksheet about the Taylor's theorem and how you can manipulate series. Good luck!!