Math 121 Take-Home Quiz #8

Due Sunday, November 14, 2021 in Gradescope by 11:59 pm ET

Instructions:

• This is an Open Notes Quiz. You can use materials, homeworks problems, lecture notes, etc. that you manually worked on.

• This is **NOT** an Open Internet Quiz. You can only access our Main Course Webpage.

• You are not allowed to work on or discuss these problems with other students or people.

• You can ask a few small, clarifying, questions in Office Hours, but the problems will not be solved for you.

• The main goal is to make a thoughtful and detailed presentation for the solutions. Submit a clear final draft. No mess please.

• Please submit your final work in Gradescope in the Quiz 8 entry.

1. [10 Points each] Use Series to compute each of the following. Your answers should be in Sigma notation. State the Radius for each problem.

(a) $\dfrac{d}{dx}\left(x^3 e^{-x^5}\right)$ (b) $\displaystyle\int x^3 \ln(1+5x)\, dx$ (c) $\dfrac{d}{dx}\left(3x^2 \cos(3x)\right)$

2. [10 Points] Estimate $\cos\left(\dfrac{1}{2}\right)$ with Error less than $\dfrac{1}{200}$. Justify.

3. [10 Points each] You do **not** need to find the Radius of Convergence. Your answers should be in Sigma notation. Justify all details.

(a) Find the MacLaurin Series Representation for the Hyperbolic Cosine $f(x) = \cosh x$, using the Definition of a MacLaurin Series. (That is, Chart Method)

(b) Demonstrate a second, different method/approach from part (a) above, to compute the MacLaurin Series for the same function, $f(x) = \cosh x$.

(Just for fun, optional) Demonstrate a third, different method/approach from parts (a) and (b) above, to compute the MacLaurin Series for the same function, $f(x) = \cosh x$.

(Just for double fun, optional) Demonstrate a fourth, different method/approach from parts (a) and (b) above, to compute the MacLaurin Series for the same function, $f(x) = \cosh x$.