Math 121   Take-Home Quiz #5

Due Sunday, March 10, 2024 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 5 entry.

For problems $1-4$, determine whether the given **Sequence** Converges or Diverges. If it converges, find the Limit. Justify. [5 points each]

1. $\left\{ \dfrac{3n^5 - 6n^2 + 7}{8n^5 + 2n^4 - 1} \right\}_{n=1}^{\infty}$ 2. $\left\{ \dfrac{n^7}{4 \ln n} \right\}_{n=2}^{\infty}$ 3. $\left\{ \dfrac{(2n-1)!}{(2n+1)!} \right\}_{n=1}^{\infty}$ 4. $\{2024\}_{n=1}^{\infty}$

5. [10 Points] Consider $\displaystyle\sum_{n=1}^{\infty} \dfrac{(-1)^n \, 3^{n+1}}{2^{3n-1}}$.

• First, explain why this **Series** Converges

• Second, show that the series Sum equals $\boxed{-\dfrac{18}{11}}$

For 6 and 7, determine whether the **Series** Converges or Diverges. Name any Convergence Test(s) you use, and justify all of your work.   [10 points each]

6. $\displaystyle\sum_{n=2}^{\infty} \dfrac{n^7}{4 \ln n}$ (hint: your work from 2. above will help here...)

7. $\displaystyle\sum_{n=1}^{\infty} \dfrac{4}{n^7} + \dfrac{4^n}{7^n}$

8. [10 Points] Use **TWO different** Methods/Tests to show that $\displaystyle\sum_{n=1}^{\infty} 2024$ Diverges. Justify.