Math 121, Sections 01, 02, 03, Fall 2021

Homework #11

Due **Friday, October 8th** in Gradescope by 11:59 pm ET

Goal: Exploring Convergence of Infinite Series. Focus on Geometric Series and the n^{th} Term Divergence Test. We may also need L'Hôpital's Rule to finish some of the limits at hand.

Determine whether each of the following Converge or Diverge. Justify.

1. $\{8\}_{n=1}^{\infty}$
2. $\sum_{n=1}^{\infty} 8$
3. $\left\{\frac{2n}{3n+1}\right\}_{n=1}^{\infty}$
4. $\sum_{n=1}^{\infty} \frac{2n}{3n+1}$

Determine whether the given series Converges or Diverges. If it converges, find the Sum value. Justify.

5. $\sum_{n=1}^{\infty} \frac{8}{5^n}$
6. $\sum_{n=0}^{\infty} \frac{8}{5^n}$
7. $\sum_{n=1}^{\infty} \frac{4^n}{9^{n-1}}$
8. $\sum_{n=1}^{\infty} \frac{7^{n+1}}{3^n}$
9. $\sum_{n=1}^{\infty} (-1)^n \frac{4^{2n+1}}{3^{3n-1}}$
10. $\sum_{n=1}^{\infty} e^n$
11. $\sum_{n=1}^{\infty} \frac{1+2^n}{3^n}$
12. $\sum_{n=0}^{\infty} \frac{1}{(1999)^n}$
13. $\sum_{n=1}^{\infty} \frac{1}{1999}$
14. $\sum_{n=1}^{\infty} \arctan n$
15. $\sum_{n=2}^{\infty} \frac{n^2}{\ln n}$
16. $\sum_{n=1}^{\infty} \sin^2\left(\frac{\pi n^4+1}{3n^4+5}\right)$
17. $\sum_{n=1}^{\infty} \left(1+\ln\left(1+\frac{5}{n}\right)\right)^n$

Consider these variable versions of Geometric Series. Find the values of x for which the series Converges. Find the sum of the Series for those values of x (answer in terms of x).

18. $\sum_{n=1}^{\infty} (-5)^n x^n$
19. $\sum_{n=0}^{\infty} \frac{(x-2)^n}{3^n}$

REGULAR OFFICE HOURS

Monday: 1:00–3:00 pm

9–10:30 pm TA Mia, SMUDD 207

Tuesday: 12:00–4:00 pm

6–7:30 pm TA Ian, SMUDD 207

7:30–9:00 pm TA Karime, SMUDD 207

Wednesday: 1:00-3:00 pm

6–7:30 pm TA Ian, SMUDD 207

7:30–9:00 pm TA Daksha, SMUDD 207

Thursday: none for Professor

1–2:30 pm TA Mia, SMUDD 207

7:30–9:00 pm TA Daksha, SMUDD 207

Friday: 12:00–2:00 pm

2:30–4:00 pm TA Karime, SMUDD 014**

Challenge yourself to work differently this week...