Math 121, Section 01, Spring 2022

Homework #10

Due **Friday, March 25th** in Gradescope by 11:59 pm ET

Goal: Exploring Limits of Infinite Sequences. We may also need L'Hôpital's Rule to finish some of the limits at hand.

List the first five terms of the Sequence. (Start with $n = 1$)

1. $a_n = \dfrac{(-1)^{n-1}}{5^n}$

2. $a_n = \dfrac{1}{(n+1)!}$

3. $a_n = \dfrac{(-1)^n\, n^2}{n+1}$

Determine whether the given sequence Converges or Diverges. If it converges, find the Limit. Justify, no guessing here.

4. $\left\{\dfrac{n}{n+1}\right\}_{n=1}^{\infty}$

5. $\left\{\dfrac{5n^2+3}{2n^2-7n}\right\}_{n=1}^{\infty}$

6. $\left\{\dfrac{3n^4-n-5}{7n^4+n^2-9}\right\}_{n=1}^{\infty}$

7. $\left\{\dfrac{\tan^{-1} n}{n}\right\}$

8. $\left\{\dfrac{n^2}{e^n}\right\}$

9. $\left\{n \sin\left(\dfrac{1}{n}\right)\right\}$

10. $\left\{\dfrac{(\ln n)^2}{n}\right\}_{n=1}^{\infty}$

11. $\left\{\dfrac{n^{99}}{\ln n}\right\}_{n=2}^{\infty}$

12. $\left\{\dfrac{\ln(99)}{n^{99}}\right\}$

13. $\left\{\left(1+\dfrac{1}{n}\right)^n\right\}_{n=1}^{\infty}$

14. $\left\{\left(1-\dfrac{5}{n^6}\right)^{n^6}\right\}_{n=1}^{\infty}$

15. $\left\{\left(1-\arcsin\left(\dfrac{3}{n^2}\right)\right)^{n^2}\right\}$

16. $\{\ln(2n^2+1)-\ln(n^2+1)\}$

17. $\left\{\dfrac{(n+3)!}{(n+1)!}\right\}_{n=1}^{\infty}$

18. $\left\{\dfrac{(2n-1)!}{(2n+1)!}\right\}$

19. $\left\{\cos^2\left(\dfrac{\pi n^6+6}{6n^6+1}\right)\right\}_{n=1}^{\infty}$

20. $\left\{\arctan\left(\dfrac{5n^7+1}{5n^7+7}\right)\right\}_{n=1}^{\infty}$

REGULAR OFFICE HOURS

Sunday: 6–7:30 pm TA Nico, SMUDD 207

Monday: 1:00–3:00 pm

6–7:30 pm TA Daksha, SMUDD 207

7:30–9:00 pm TA Karime, SMUDD 207

Tuesday: 12:00–4:00 pm

6–7:30 pm TA Ian, SMUDD 207

7:30–9:00 pm TA Nico, SMUDD 207

Wednesday: 1:00-3:00 pm

9–10:30 pm TA Daksha, SMUDD 207

Thursday: none for Professor

6–7:30 pm TA Ian, SMUDD 207

7:30–9:00 pm TA Karime, SMUDD 207

Friday: 12:00–2:00 pm

dig deep, check notation, reference, justify, search, clarify...

challenge to everyone this week, get help on a challenging problem in office hours with me or a Math Fellow