Math 121, Section(s) 01, Spring 2024

Homework #17

Due **Friday, April 19th** in Gradescope by 11:59 pm ET

Goal: Exploring Estimating Values and Definite Integrals using the Alternating Series Estimation Theorem. Also some review of Interval and Radius of Convergence.

1. Use Series to Estimate $\frac{1}{e}$ with error less than $\frac{1}{20}$. Justify.

2. Use Series to Estimate $\frac{1}{e}$ with error less than $\frac{1}{100}$. Justify. (Can reuse work from 1)

3. Use Series to Estimate $\frac{1}{e}$ with error less than $\frac{1}{500}$. Justify. (Can reuse work from 1)

4. Use Series to Estimate $\sin(1)$ with error less than $\frac{1}{1000}$. Justify.

5. Use Series to Estimate $e^{-\frac{1}{3}}$ with error less than $\frac{1}{100}$. Justify.

6. Use Series to Estimate $\arctan\left(\frac{1}{2}\right)$ with error less than $\frac{1}{100}$. Justify.

7. Use Series to Estimate $\int_0^1 x\ln(1+x^3)\,dx$ with error less than $\frac{1}{20}$. Justify.

8. Use Series to Estimate $\int_0^1 x\sin(x^2)\,dx$ with error less than $\frac{1}{1000}$. Justify.

Review: Find the Interval and Radius of Convergence for each of the following.

9. $\sum_{n=1}^{\infty}(n!)^2(3x-7)^n$

10. $\sum_{n=1}^{\infty}\frac{(-1)^n\,(5x-2)^n}{n^3\,8^n}$

11. $\sum_{n=1}^{\infty}\frac{(x-7)^n}{n!\,\sqrt{n}}$

12. New! Use Series to compute $\lim_{x\to 0}\frac{1-\cos x}{1+x-e^x}$. Check answer with L'H Rule too.

REGULAR OFFICE HOURS

Monday: 12:00–3:00 pm

6:00–7:30 pm TA Gretta, SMUDD 208

Tuesday: 1:00–4:00 pm

7:30–9:00 pm TA Aidee, SMUDD 208

9–10:30 pm TA Natalie, SMUDD 208

Wednesday: 1:00-3:00 pm

7:30–9:00 pm TA Gretta, SMUDD 208

Thursday: none for Professor

7:30–9:00 pm TA Aidee, SMUDD 208

9:00–10:30 pm TA Natalie, SMUDD 208

Friday: 12:00–2:00 pm

Chase the fine details and make a full justification.

YES! Vacation!