Math 121, Sections 01 and 02, Fall 2022

Homework #17

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 $\dfrac{1}{e}$ with error less than $\dfrac{1}{20}$. Justify.

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

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

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

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

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

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

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

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

9. $\displaystyle\sum_{n=1}^{\infty}(n!)^2(3x-7)^n$ 10. $\displaystyle\sum_{n=1}^{\infty}\dfrac{(-1)^n\,(5x-2)^n}{n^3\,8^n}$ 11. $\displaystyle\sum_{n=1}^{\infty}\dfrac{(x-7)^n}{n!\,\sqrt{n}}$

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

REGULAR OFFICE HOURS

Monday: 12:00–3:00 pm

7:30–9:00 pm TA Aidee, SMUDD 206

9:00–10:30 pm TA Mia, SMUDD 206

Tuesday: 1:00–4:00 pm

6–7:30 pm TA Admire, SMUDD 206

7:30–9:00 pm TA Karime, SMUDD 206

9–10:30 pm TA Ali, SMUDD 206

Wednesday: 1:00-3:00 pm

6–7:30 pm TA Admire, SMUDD 206

7:30–9:00 pm TA Ali, SMUDD 206

Thursday: none for Professor

1-2:30 pm TA Mia, SMUDD 205

7:30–9:00 pm TA Aidee, SMUDD 206

9–10:30 pm TA Karime, SMUDD 207

Friday: 12:00–2:00 pm

Chase the fine details and make a full justification.

YES! Vacation!