Math 121-03, Fall 2024 Professor Rob Benedetto

Homework #17

Due **Wednesday, November 20** in Gradescope by **11:59 pm ET**

- **REVIEW** your class notes about Taylor and MacLaurin series
- **CONSULT** Sections 11.10 and 11.11 of the Stewart Calculus textbook
- **WRITE AND SUBMIT** solutions to the 12 assigned problems in this handout

NOTE: Show your work, as always.

Assigned Problems for HW 17

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

Exercise 2. Use Series to estimate $\frac{1}{e}$ with error less than $\frac{1}{100}$. Justify.
(You can reuse work you did in #1)

Exercise 3. Use Series to estimate $\frac{1}{e}$ with error less than $\frac{1}{500}$. Justify.
(You can reuse work you did in #1)

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

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

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

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

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

Exercises 9–11. Review: Find the Interval and Radius of Convergence of each of the following power series.

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

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

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

Exercise 12. Use Series to compute $\lim_{x\to 0}\frac{1-\cos x}{1+x-e^x}$.
Then check your answer with L'Hôpital's Rule.

My (Drop-In) Office Hours: SMUD 406

Tuesday: 1:30–3:00 pm

Thursday: 1:30–3:00 pm

Friday: 2:00–3:00 pm

(or by appointment)

Math Fellow Evening Drop-in Hours: SMUD 207

Sunday	6:00–7:30pm:	**Natalie** Stott
Sunday	7:30–9:00pm:	**Oscar** Hernandez
Monday	6:00-7:30pm:	**Aaron** Cordoba
Monday	7:30–9:00pm:	**Oscar** Hernandez
Tuesday	6:00-7:30pm:	**Gretta** Ineza
Wednesday	7:30–9:00pm:	**Natalie** Stott
Thursday	6:00-7:30pm:	**Gretta** Ineza
Thursday	7:30–9:00pm:	**DJ** Beason
Friday	6:00-7:30pm:	**Aaron** Cordoba
Friday	7:30–9:00pm:	**DJ** Beason

• My Office Hours are times to drop in to my office, unannounced. Math Fellow hours are also for unannounced drop-ins, in SMUD 207, at the hours above.
All are welcome! Just stop by. Working on your calculus assignment can be fun! I encourage you to come hang out at many of these help sessions.

• **NO LATE HOMEWORK!** unless illness or emergency occurs.