Homework #18

Due **Friday, November 22** 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 23 assigned problems in this handout

NOTE: Show your work, as always.

Assigned Problems for HW 18

Exercises 1–22: Find the **sum** of each of the following series (which do converge). Simplify.

1. $1 - \dfrac{1}{3} + \dfrac{1}{5} - \dfrac{1}{7} + \dfrac{1}{9} - \cdots$
2. $\displaystyle\sum_{n=0}^{\infty} \frac{(-1)^n \, \pi^{2n+1}}{9^n \, (2n)!}$
3. $-\dfrac{\pi^3}{3!} + \dfrac{\pi^5}{5!} - \dfrac{\pi^7}{7!} + \dfrac{\pi^9}{9!} - \cdots$
4. $-\dfrac{1}{3} + \dfrac{1}{5} - \dfrac{1}{7} + \dfrac{1}{9} - \cdots$
5. $-1 + \dfrac{1}{2} - \dfrac{1}{3} + \dfrac{1}{4} - \dfrac{1}{5} + \dfrac{1}{6} - \cdots$
6. $\displaystyle\sum_{n=0}^{\infty} \frac{(-1)^n \, (\ln 8)^n}{3^{n+1} \, n!}$
7. $\displaystyle\sum_{n=0}^{\infty} \frac{(-1)^n \, \pi^{2n}}{(36)^n \, (2n+1)!}$
8. $\dfrac{1}{6} - \dfrac{1}{2(6)^2} + \dfrac{1}{3(6)^3} - \dfrac{1}{4(6)^4} + \cdots$
9. $1 - e + \dfrac{e^2}{2!} - \dfrac{e^3}{3!} + \dfrac{e^4}{4!} - \dfrac{e^5}{5!} + \cdots$
10. $-\dfrac{\pi^2}{2!} + \dfrac{\pi^4}{4!} - \dfrac{\pi^6}{6!} + \dfrac{\pi^8}{8!} - \cdots$
11. $\displaystyle\sum_{n=0}^{\infty} \frac{(-1)^n \, \pi^{2n}}{(2n)!}$
12. $\displaystyle\sum_{n=0}^{\infty} \frac{1}{e^n}$
13. $\displaystyle\sum_{n=0}^{\infty} \frac{(-1)^{n+1} \, 2^{n+1} \, (\ln 9)^n}{n!}$
14. $4 - \dfrac{4}{3} + \dfrac{4}{5} - \dfrac{4}{7} + \dfrac{4}{9} - \cdots$
15. $\displaystyle\sum_{n=0}^{\infty} \frac{e^6 \, (x-6)^n}{n!}$ (answer will be in x)
16. $\displaystyle\sum_{n=0}^{\infty} \frac{(-1)^{n+1} \, \pi^{2n+1}}{9 \, (2n)!}$
17. $\displaystyle\sum_{n=0}^{\infty} \frac{1}{3! \, \pi^n}$
18. $-\pi + \dfrac{\pi^3}{3!} - \dfrac{\pi^5}{5!} + \cdots$
19. $1 + 1 - \dfrac{1}{3} + \dfrac{1}{5} - \dfrac{1}{7} + \cdots$
20. $2 - 1 + \dfrac{2}{3} - \dfrac{2}{4} + \dfrac{2}{5} - \cdots$
21. $\dfrac{1}{2!} - \dfrac{1}{3!} + \dfrac{1}{4!} - \dfrac{1}{5!} + \cdots$
22. $\displaystyle\sum_{n=0}^{\infty} \frac{(-1)^n \pi^{2n+1}}{\left(\sqrt{2}\right)^{4n} (2n)!}$

Exercise 23: Use series to compute $\displaystyle\lim_{x \to 0} \frac{xe^x - \arctan x}{\ln(1+5x) - 5x}$

Check your answer using 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.