

**Homework #17**Due **Friday, November 17th** 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  $\lim_{x \rightarrow 0} \frac{1 - \cos x}{1 + x - e^x}$ . Check answer with L'H Rule too.

# REGULAR OFFICE HOURS

**Monday: 12:00–3:00 pm**

7:30–9:00 pm TA Admire, SMUDD 206

9:00–10:30 pm TA Aidee, SMUDD 206

**Tuesday: 1:00–4:00 pm**

6–7:30 pm TA Natalie, SMUDD 206

7:30–9:00 pm TA Gretta, SMUDD 206

9–10:30 pm TA Aidee, SMUDD 206

**Wednesday: 1:00-3:00 pm**

6–7:30 pm TA Admire, SMUDD 206

7:30–9:00 pm TA James, SMUDD 206

9–10:30 pm TA Natalie, SMUDD 206

**Thursday: none for Professor**

6:00–7:30 pm TA Gretta, SMUDD 206

7:30–9:00 pm TA James, SMUDD 206

**Friday: 12:00-2:00 pm**

Chase the fine details and make a full justification.

YES! Vacation!