

Homework #12Due **Friday, April 1st** in Gradescope by 11:59 pm ET

Goal: Exploring Convergence of Infinite Series. Focus on Integral Test, p -series, Comparison and Limit Comparison Test. We will also focus on fluency of training, using multiple tests.

Use the Integral Test to determine whether the given series Converges or Diverges. You need to check the 3 pre-conditions each time.

$$1. \sum_{n=1}^{\infty} \frac{1}{n} \quad 2. \sum_{n=1}^{\infty} \frac{1}{n^3} \quad 3. \sum_{n=2}^{\infty} \frac{1}{n \ln n} \quad 4. \sum_{n=1}^{\infty} \frac{n}{e^n}$$

5. Consider $\sum_{n=1}^{\infty} \frac{1}{n^2 + 4}$. Use **two** Different methods, namely the Integral Test and the Comparison Test, to prove that this series Converges.

Determine whether the given series Converges or Diverges using a Comparison Test.

$$6. \sum_{n=1}^{\infty} \frac{9^n}{3 + 10^n} \quad 7. \sum_{n=1}^{\infty} \frac{n^2 + 5}{n^3} \quad 8. \sum_{n=1}^{\infty} \frac{2}{\sqrt{n} + 2} \quad 9. \sum_{n=1}^{\infty} \frac{n^2 + 7}{n^7 + 2}$$

10. Consider $\sum_{n=1}^{\infty} \frac{5n^2 + n}{n^4}$. Use **two** Different methods to prove that this series Converges. Use the Limit Comparison Test and then a *split-split* technique into p -series pieces.

Determine whether the given series Converges or Diverges. Justify.

$$11. \sum_{n=1}^{\infty} \sin^2 \left(\frac{\pi n^4 + 1}{6n^4 + 5} \right) \quad 12. \sum_{n=1}^{\infty} \frac{\sin^2(\pi n^4 + 1)}{6n^4 + 5} \quad 13. \sum_{n=1}^{\infty} \frac{7}{n^9} + \frac{7^n}{9^n}$$

Review

$$14. \sum_{n=1}^{\infty} n^6 + 6 \quad 15. \sum_{n=1}^{\infty} \frac{n^6 + 6}{n^6 + 1} \quad 16. \sum_{n=1}^{\infty} \frac{1}{n^6 + 1}$$

REGULAR OFFICE HOURS

Sunday: 6–7:30 pm TA Nico, SMUDD 207

Monday: 1:00–3:00 pm

6–7:30 pm TA Daksha, SMUDD 207

7:30–9:00 pm TA Karime, SMUDD 207

Tuesday: 12:00–4:00 pm

6–7:30 pm TA Ian, SMUDD 207

7:30–9:00 pm TA Nico, SMUDD 207

Wednesday: 1:00–3:00 pm

9–10:30 pm TA Daksha, SMUDD 207

Thursday: none for Professor

6–7:30 pm TA Ian, SMUDD 207

7:30–9:00 pm TA Karime, SMUDD 207

Friday: 12:00–2:00 pm

Train your Convergence Tests Daily