

Math 2924, Problem Set, October 29

PROBLEMS:

1) State the Test for Divergence. In the list below find at least two infinite series for which the Test for Divergence applies. (Number 14 is one—can you show it?)

2) How many geometric series can you find? Calculate the sum of those that converge. (Number 8 is one.)

3) Series number 29 is a p -series. Does it converge?

4) Find infinite series in the list below for the integral can be applied to show convergence, and another to show divergence. Calculate the integral. (Try number 32.)

5) Find some infinite series in the list where the Comparison Test can be used to determine convergence/divergence. (How about number 23?)

$$1. \sum_{n=0}^{\infty} \frac{n^3 + 2n^2 - 111}{n^7 - 3n^6 + n^5 + 1}$$

$$2. \sum_{n=0}^{\infty} \frac{(-1)^n}{n^2}$$

$$3. \sum_{n=0}^{\infty} \frac{n^2}{(-1)^n}$$

$$4. \sum_{n=0}^{\infty} \frac{n^5}{5^n}$$

$$5. \sum_{n=1}^{\infty} \frac{5^n}{n^5}$$

$$6. \sum_{n=1}^{\infty} \left(\frac{2}{3}\right)^n$$

$$7. \sum_{n=1}^{\infty} \frac{n + 2^n}{3^n - 1}$$

$$8. \sum_{n=1}^{\infty} e^{-.02n}$$

$$9. \sum_{n=1}^{\infty} ne^{-.02n}$$

$$10. \sum_{n=1}^{\infty} \frac{(-1)^n}{\sqrt{n} + \sqrt{n+1}}$$

$$11. \sum_{n=2}^{\infty} \frac{1}{n(\ln n)^{3/2}}$$

$$12. \sum_{n=2}^{\infty} \frac{(-1)^n}{\ln n}$$

$$13. \sum_{n=1}^{\infty} \frac{1}{n\sqrt{n + \ln(n)}}$$

$$14. \sum_{n=1}^{\infty} \frac{n^n}{n!}$$

15. $\sum_{n=0}^{\infty} \frac{e^n}{n!}$
16. $\sum_{n=1}^{\infty} \frac{1}{\sqrt[3]{n}(1+\sqrt{n})}$
17. $\sum_{n=1}^{\infty} \frac{1}{n-100.1}$
18. $\sum_{n=1}^{\infty} \frac{\cos(\pi n)}{n^{2/3}}$
19. $\sum_{n=1}^{\infty} \sin^2 \frac{\pi}{n}$
20. $\sum_{n=1}^{\infty} \frac{2^{2n+1}}{n!}$
21. $\sum_{n=1}^{\infty} \cos \frac{1}{n}$
22. $\sum_{n=1}^{\infty} \left(\cos \frac{1}{n} \right)^{n^3}$
23. $\sum_{n=1}^{\infty} \frac{1}{3^n + 5^n}$
24. $\sum_{n=1}^{\infty} \frac{1}{\sqrt{n^4 + 1}}$
25. $\sum_{n=1}^{\infty} \frac{(-1)^n n!}{(2n)!}$
26. $\sum_{n=1}^{\infty} \frac{n-1}{n^2}$
27. $\sum_{n=1}^{\infty} (-1)^n \frac{\ln n}{n^2}$
28. $\sum_{n=0}^{\infty} \frac{(2n)!}{(3n)!}$
29. $\sum_{n=1}^{\infty} \frac{1}{\sqrt[4]{n} \sqrt[3]{n} \sqrt{n}}$
30. $\sum_{n=0}^{\infty} (-1)^{n+1} \frac{n!}{2 \cdot 4 \cdot 6 \cdots (2n)}$
31. $\sum_{n=2}^{\infty} \frac{5^{2n/3}}{6^{n-2}}$
32. $\sum_{n=0}^{\infty} n e^{-n^2}$