Stewart Chapter 11 Review Homework Hints

Determine whether the series is convergent or divergent

11. Use the Limit Comparison Test $\sum_{n=1}^{\infty}\frac{n}{n^3+1} \sim \sum_{n=1}^{\infty}\frac{1}{n^2}$

12. Use the Limit Comparison Test with $\sum_{n=1}^{\infty}\frac{1}{n}$

13. Use the Ratio Test or Root Test

14. Use Alternating Series Test

15. Use Integral Test $\sum_{n=1}^{\infty}\frac{1}{n\sqrt{\ln(n)}} \leftrightarrow \int_{1}^{\infty}\frac{1}{x\sqrt{\ln(x)}}\,dx$

16. Use Telescoping Series $\sum_{n=1}^{\infty}\ln\left(\frac{n}{3n+1}\right)=\sum_{n=1}^{\infty}\ln(n)-\ln(3n+1)$

17. Use Direct Comparison Test $\sum_{n=1}^{\infty}\frac{\cos(3n)}{1+\left(1.2^n\right)} \le \sum_{n=1}^{\infty}\frac{1}{(1.2)^n}=\sum_{n=1}^{\infty}\left(\frac{1}{1.2}\right)^n$

18. Use the Root Test $\sum_{n=1}^{\infty}\frac{n^{2n}}{\left(1+2n^2\right)^n}=\sum_{n=1}^{\infty}\left(\frac{n^2}{\left(1+2n^2\right)}\right)^n$

19. Use the Ratio Test

20. Use the Root Test $\sum_{n=1}^{\infty}\frac{(-5)^{2n}}{n^2 9^n}=\sum_{n=1}^{\infty}\frac{25^n}{n^2 9^n}$

21. Use the Alternating Series Test

22. $\sum_{n=1}^{\infty}\frac{\sqrt{n+1}-\sqrt{n-1}}{n}=\sum_{n=1}^{\infty}\frac{\sqrt{n+1}-\sqrt{n-1}}{n}\cdot\frac{\left(\sqrt{n+1}+\sqrt{n-1}\right)}{\left(\sqrt{n+1}+\sqrt{n-1}\right)}=\sum_{n=1}^{\infty}\frac{n}{n\left(\sqrt{n+1}+\sqrt{n-1}\right)}$ Then use the Limit comparison Test with $\sum_{n=1}^{\infty}\frac{1}{2\sqrt{n}}$

Find the sum of the series

27. $\sum_{n=1}^{\infty}\frac{(-3)^{n-1}}{2^{3n}}=\sum_{n=1}^{\infty}\frac{(-3)^{n-1}}{2^{3n}}\cdot\frac{(-3)}{(-3)}=\sum_{n=1}^{\infty}-\frac{1}{3}\cdot\left(\frac{-3}{8}\right)^n$ Use Geometric Series Formula

28. $\sum_{n=1}^{\infty}\frac{1}{n(n+3)}=\sum_{n=1}^{\infty}\frac{1}{3n}-\frac{1}{3(n+3)}$ Use Telescoping Series

29. Use Telescoping Series

30. $\sum_{n=0}^{\infty}\frac{(-1)^n\pi^n}{3^{2n}(2n)!}=\sum_{n=0}^{\infty}\frac{(-1)^n\left(\sqrt{\pi}\right)^{2n}}{3^{2n}(2n)!}=\sum_{n=0}^{\infty}(-1)^n\frac{\left(\frac{\sqrt{\pi}}{3}\right)^{2n}}{(2n)!}$

31. $e^x = \sum_{n=0}^{\infty} \frac{x^n}{n!} \to e^{(-e)} = \sum_{n=0}^{\infty} \frac{(-e)^n}{n!} = 1 + (-e) + \frac{(-e)^2}{2!} + \frac{(-e)^3}{3!} + \cdots$