

Alternating Series

Determine whether the series converge absolutely, converge conditionally, or diverge. Justify.

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| 1. $\sum_{n=1}^{\infty} \frac{(-1)^n}{\sqrt{n}}$ | 16. $\frac{1}{\sqrt{2}} - \frac{1}{\sqrt{4}} + \frac{1}{\sqrt{6}} - \frac{1}{\sqrt{8}} + \dots + \frac{(-1)^{n+1}}{\sqrt{2n}} + \dots$ | 3. Diverges. |
| 2. $\sum_{n=1}^{\infty} \frac{(-1)^n(2n+1)}{n^2}$ | 17. $\sum_{n=1}^{\infty} \frac{(-1)^{n+1}n^2}{n^3+1}$ | 4. Converges conditionally. |
| 3. $\sum_{n=1}^{\infty} \frac{(-1)^n e^n}{n}$ | 18. $\sum_{n=0}^{\infty} \frac{(-1)^n(4n)!}{n!}$ | 5. Converges conditionally. |
| 4. $\sum_{n=1}^{\infty} (-1)^n \frac{\ln n}{n}$ | 19. $\sum_{n=1}^{\infty} (-1)^{n+1} \frac{n+1}{n\sqrt{n}}$ | 6. Converges conditionally. |
| 5. $\sum_{n=1}^{\infty} \frac{(-1)^n}{\sqrt{n} + \sqrt{n+1}}$ | 20. $\sum_{k=1}^{\infty} (-1)^k \left(\frac{k}{2}\right)^k$ | 7. Converges conditionally. |
| 6. $\sum_{n=3}^{\infty} \frac{(-1)^n}{\sqrt{n(n-1)}}$ | 21. $\sum_{k=1}^{\infty} (-1)^k \frac{k}{e^k}$ | 8. Converges conditionally. |
| 7. $\sum_{n=1}^{\infty} (-1)^n \ln \sqrt[n]{n}$ | 22. $\sum_{n=1}^{\infty} \frac{(-1)^n(n+1)}{5n^4 - 4n + 3}$ | 9. Converges conditionally. |
| 8. $\sum_{n=2}^{\infty} \frac{(-1)^n}{n \ln n}$ | 23. $\sum_{n=1}^{\infty} \frac{(-1)^n n^{3/2}}{n^2 + 3}$ | 10. Converges absolutely. |
| 9. $\sum_{n=1}^{\infty} \frac{(-1)^n(n^2+1)}{n^3}$ | 24. $\sum_{n=2}^{\infty} \frac{(-1)^n}{n\sqrt{\ln n}}$ | 11. Converges conditionally. |
| 10. $\sum_{n=1}^{\infty} \frac{(-1)^n 5n^2}{(n+1)!}$ | 25. $\sum_{n=1}^{\infty} (-1)^n \frac{n+1}{n\sqrt{n}}$ | 12. Converges absolutely. |
| 11. $\sum_{n=1}^{\infty} \frac{(-1)^n}{\ln(n+1)}$ | 26. $\sum_{n=1}^{\infty} \frac{(-1)^n}{n!}$ | 13. Converges conditionally. |
| 12. $\sum_{n=1}^{\infty} \frac{(-1)^n}{(3n+2)(n+1)}$ | 27. $\sum_{n=1}^{\infty} \frac{(-1)^n(3n+2)}{n^2+1}$ | 14. Diverges. |
| 13. $\sum_{n=1}^{\infty} \frac{(-1)^n}{n^{4/5}}$ | 28. $\sum_{n=1}^{\infty} (-1)^{n+1} \left[\frac{3n+1}{n+4}\right]^n$ | 15. Converges absolutely. |
| 14. $\sum_{n=1}^{\infty} \frac{(-1)^n n}{n+2}$ | | 16. Converges conditionally. |
| 15. $\sum_{n=2}^{\infty} \frac{(-1)^n 3^{n+1}}{(n-2)!}$ | | 17. Converges conditionally. |

Answers:

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| 1. Converges conditionally. | 20. Diverges. | 27. Converges conditionally. |
| 2. Converges conditionally. | 21. Converges absolutely. | 28. Diverges. |