



Lista de ejercicios de la lección 3.1

Instrucciones. Enlistar los primeros 4 términos y el n-ésimo término de la sucesión.

1. $a_n = 2n!$

2. $a_n = \sum_{k=1}^n \frac{1}{k}$

3. $a_n = \sum_{k=1}^n 2^{-k}$

Determinar los primeros 4 términos y el n-ésimo término de la sucesión definida recurrentemente.

4. $a_1 = 1 \quad a_{k+1} = a_{k+1}$

5. $a_1 = 1 \quad a_{k+1} = (k+1)a_k$

6. $a_1 = 2 \quad a_{k+1} = a_k + \frac{1}{2^k}$

7. $a_1 = 1 \quad a_{k+1} = \frac{a_k}{k+1}$

8. $a_1 = 2 \quad a_{k+1} = 2a_k$

9. $a_1 = 1, a_{k+1} = 1 + \frac{1}{2}a_k$

Determinar una fórmula para el término general de la sucesión y determine si converge.

10. $\left\{ \frac{2}{1}, \frac{4}{3}, \frac{6}{5}, \frac{8}{7}, \dots \right\}$

11. $\left\{ 1 + \frac{1}{2}, \frac{1}{2} + \frac{1}{3}, \frac{1}{3} + \frac{1}{4}, \frac{1}{4} + \frac{1}{5}, \dots \right\}$

12. $\left\{ 3, -5, 7, -9, \dots \right\}$

13. $\left\{ \frac{1}{1 \times 4}, \frac{1}{2 \times 8}, \frac{1}{3 \times 16}, \frac{1}{4 \times 32}, \dots \right\}$

Determinar si la sucesión converge o diverge; si converge calcule el límite.



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| 14. $\{-3\}$ | 36. $\left\{\ln n - \ln(n^2 + 1)\right\}$ | 58. $\left\{\cos(n\pi)\right\}$ |
| 15. $\{15(-1)^{n-1}\}$ | 37. $\left\{\cos^{-1}\left(\frac{n^3}{2n^3 + 1}\right)\right\}$ | 59. $\left\{n \sin\left(\frac{1}{n}\right)\right\}$ |
| 16. $\left\{2\left(-\frac{1}{5}\right)^{n+1}\right\}$ | 38. $a_n = \frac{\ln(n+1)}{\sqrt{n}}$ | 60. $\left\{n \sin\left(\frac{6}{n}\right)\right\}$ |
| 17. $a_n = 6\left(\frac{-5}{6}\right)^n$ | 39. $\left\{\sqrt{n+2} - \sqrt{n}\right\}$ | 61. $\left\{2^{-n} \sin n\right\}$ |
| 18. $\{1 + (0.1)^n\}$ | 40. $\left\{\sqrt{n^2 + n} - n\right\}$ | 62. $\left\{\frac{\cos^2 n}{3^n}\right\}$ |
| 19. $\{1 + (-1)^n\}$ | 41. $\left\{\sqrt{n+1} - \sqrt{n-1}\right\}$ | 63. $\left\{\frac{(3)(2^{-n})}{\csc n}\right\}$ |
| 20. $a_n = \frac{100n}{n^{\frac{3}{2}} + 4}$ | 42. $\left\{n - \sqrt{n^2 - n}\right\}$ | 64. $\left\{\frac{\cos n}{n}\right\}$ |
| 21. $a_n = (-1)^{n+1} \frac{\sqrt{n}}{n+1}$ | 43. $\left\{\sqrt{n}(\sqrt{n+1} - \sqrt{n})\right\}$ | 65. $\left\{\frac{n^{-6}}{\csc n}\right\}$ |
| 22. $\left\{\frac{n-2}{\sqrt{n}}\right\}$ | 44. $\left\{\sqrt[3]{3^{2n+1}}\right\}$ | 66. $\left\{\frac{n^{-10}}{\sec n}\right\}$ |
| 23. $\left\{\frac{\sqrt{n+1}}{n}\right\}$ | 45. $a_n = \sqrt[n]{n^2 + n}$ | 67. $\left\{\frac{\sin^2 n}{4^n}\right\}$ |
| 24. $\left\{\frac{(3n-2)(2n+1)}{2n^3 - 1}\right\}$ | 46. $a_n = \left(\frac{3}{n}\right)^{\frac{1}{n}}$ | 68. $\left\{\frac{3^n}{n!}\right\}$ |
| 25. $a_n = \frac{(2n-1)(3n+1)}{n^3 + 1}$ | 47. $\left\{\left(1 + \frac{1}{n}\right)^n\right\}$ | 69. $\left\{\frac{8^{2n}}{n!}\right\}$ |
| 26. $\left\{\frac{5 - 3n^2}{2 + n^2}\right\}$ | 48. $\left\{\left(\frac{n-2}{n}\right)^n\right\}$ | 70. $\{2^{-n} n!\}$ |



$$27. \left\{ \frac{4 - n^3}{5 + 3n^3} \right\} \quad 49. \left\{ \left(\frac{n+1}{n-1} \right)^n \right\} \quad 71. \left\{ \frac{n!}{6^n} \right\}$$

$$28. \left\{ \frac{n^2}{2n-1} - \frac{n^2}{2n+1} \right\} \quad 50. \left\{ \frac{e^n + 1}{e^n} \right\} \quad 72. \left\{ \frac{3^n 6^n}{2^{-n} n!} \right\}$$

$$29. \left\{ (-1)^{n+1} \frac{3n}{n^2 + 4n + 5} \right\} \quad 51. \left\{ \frac{e^n - e^{-n}}{e^n + e^{-n}} \right\} \quad 73. \left\{ \frac{n!}{n^n} \right\}$$

$$30. \left\{ \frac{n^2}{n(n+1)} \right\} \quad 52. \left\{ \frac{5 - 2^{-n}}{7 + 4^{-n}} \right\} \quad 74. a_n = \left\{ \frac{n^n}{n!} \right\}$$

$$31. a_n = \frac{n}{2^n} \quad 53. \left\{ 4 + \frac{3^n}{2^n} \right\} \quad 75. a_n = \tanh n$$

$$32. \left\{ \ln \left(\frac{2n+1}{5n-1} \right) \right\} \quad 54. \left\{ \frac{3^n}{2^{2n}} \right\} \quad 76. a_n = \arctan n$$

$$33. \left\{ \ln \left(\frac{12n+2}{4n-9} \right) \right\} \quad 55. \left\{ \frac{e^n}{4^n} \right\} \quad 77. a_n = \frac{1}{n} \int_1^n \frac{1}{x} dx$$

$$34. \left\{ \frac{\ln(n+1)}{\ln(3n)} \right\} \quad 56. a_n = \left\{ \frac{3^n}{n^3} \right\}$$

$$35. \left\{ \frac{n^2}{\ln(n+1)} \right\} \quad 57. \left\{ (-1)^n n^3 2^{-n} \right\}$$

Utilizar el Teorema de intercalación para sucesiones para determinar si la sucesión dada converge.

$$78. \left\{ \sqrt{16 + \frac{1}{n^2}} \right\}$$

$$79. \left\{ \frac{\ln n}{n(n+2)} \right\}$$

$$80. \left\{ \frac{n!}{n^n} \right\}$$