

“Guía Sucesiones”

I. Escriba los 5 primeros de las siguientes sucesiones:

9. $\left(\frac{n}{n+2}\right)_{n \in \mathbb{N}}$

10. $\left(\frac{1}{\sqrt{n}}\right)_{n \in \mathbb{N}}$

11. $\left(\frac{2n}{n!}\right)_{n \in \mathbb{N}}$

12. $\left(\frac{\cos n\pi}{n}\right)_{n \in \mathbb{N}}$

13. $\left(\frac{3n-1}{n}\right)_{n \in \mathbb{N}}$

14. $\left(\frac{\sin n\pi}{2n}\right)_{n \in \mathbb{N}}$

15. $\left(\left(-\frac{1}{2}\right)^n\right)_{n \in \mathbb{N}}$

16. $\left(\frac{n^2}{n-3}\right)_{n \in \mathbb{N}}$
17. $\left(\left(1+\frac{1}{n}\right)^n\right)_{n \in \mathbb{N}}$

18. $\left(1+\left(\frac{-1}{n}\right)^n\right)_{n \in \mathbb{N}}$

19. $\left(n-\frac{1}{n}\right)_{n \in \mathbb{N}}$

20. $\left(\sin \frac{n\pi}{2}\right)_{n \in \mathbb{N}}$

21. $\left(\frac{2n+3}{3n}\right)_{n \in \mathbb{N}}$

22. $\left(\frac{n^2+1}{n+3}\right)_{n \in \mathbb{N}}$

23. $\left(\frac{n^2}{n+4}\right)_{n \in \mathbb{N}}$

24. $\left(\frac{2n}{3^n}\right)_{n \in \mathbb{N}}$
1. $\left(\frac{(-1)^{\frac{n(n+1)}{2}}}{n^2}\right)_{n \in \mathbb{N}}$

2. $\left(\frac{n}{2^{n+2}}\right)_{n \in \mathbb{N}}$

3. $\left((-1)^n \sqrt{n}\right)_{n \in \mathbb{N}}$

4. $\left(\frac{n^2-n}{n!}\right)_{n \in \mathbb{N}}$

5. $\left(\sqrt[n+1]{a_n}\right)_{n \in \mathbb{N}}$

6. $\left(\frac{n \cdot \sin\left(n \cdot \frac{\pi}{2}\right)}{1-(n+3)^4}\right)_{n \in \mathbb{N}}$

7. $\left(\frac{\log_b n}{n}\right)_{n \in \mathbb{N}}, b > 1$

8. $\left(\frac{1}{\sqrt{n^2+1}-n}\right)_{n \in \mathbb{N}}$

25. $(a_n)_{n \in \mathbb{N}}$ definida por: $a_1 = 1, \quad a_{n+1} = 1 + \frac{1}{a_n}$
26. $(a_n)_{n \in \mathbb{N}}$ definida por: $a_1 = \sqrt{2}, \quad a_{n+1} = \sqrt{2 + a_n}$
27. $(a_n)_{n \in \mathbb{N}}$ definida por: $a_1 = 2, \quad a_{n+1} = \frac{3(1+a_n)}{3+a_n}$

II. Escriba una expresión para el n-ésimo término de cada sucesión

1. $\{1, -2, 4, -8, 16, \dots\}$
2. $\{5, 9, 13, 17, \dots\}$
3. $\{1, 1 \cdot 1, 1 \cdot 1 \cdot 1, 1 \cdot 1 \cdot 1 \cdot 1, \dots\}$
4. $\left\{\frac{2}{3}, \frac{3}{4}, \frac{4}{5}, \frac{5}{6}, \dots\right\}$
5. $\left\{\frac{1}{2}, \frac{3}{4}, \frac{7}{8}, \frac{15}{16}, \dots\right\}$
6. $\left\{\frac{2}{3}, \frac{5}{8}, \frac{10}{13}, \frac{17}{18}, \dots\right\}$
7. $\left\{\frac{1}{4}, -\frac{1}{9}, \frac{1}{16}, -\frac{1}{25}, \dots\right\}$
8. $\left\{\frac{1}{2 \cdot 3}, \frac{2}{3 \cdot 4}, \frac{3}{4 \cdot 5}, \frac{4}{5 \cdot 6}, \dots\right\}$
9. $\left\{2, 1 + \frac{1}{2}, 1 + \frac{1}{3}, 1 + \frac{1}{4}, \dots\right\}$

III. Para las siguientes sucesiones, cuyo término general s_n está dado, encuentre S_2 , S_4 y S_8

1. $s_{n=} = 1 + \frac{1}{2} + \frac{1}{4} + \dots + \frac{1}{2^n}$
2. $s_{n=} = 1 + 2 + 3 + \dots + n$
3. $s_{n=} = 1 - \frac{1}{2!} + \frac{1}{3!} + \dots + \frac{(-1)^{n+1}}{n!}$
4. $s_{n=} = \frac{1}{n^2} + \frac{2}{n^2} + \frac{3}{n^2} + \dots + \frac{n-1}{n^2}$
5. $s_{n=} = \frac{1}{3+1} + \frac{1}{3^2+1} + \frac{1}{3^3+1} + \dots + \frac{1}{3^n+1}$

IV. Clasifique las siguientes sucesiones $\{s_n\}_n$ como: monótonas, acotadas, convergentes

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| 14. $s_n = n^2$ | 12. $s_n = 4 - \frac{1}{n}$ | 20. $s_n = \frac{2^n}{n!}$ |
| 15. $s_n = n^3$ | 1. $s_n = \left(-\frac{2}{3}\right)^n$ | 8. $s_n = \frac{n^2+2}{n}$ |
| 16. $s_n = \frac{4n+5}{n+2}$ | 2. $s_n = \frac{3^n+1}{3^n}$ | 9. $s_n = \frac{n^2}{n+4}$ |
| 17. $s_n = \frac{5^n+2}{5^n}$ | 3. $s_n = \frac{2n+1}{n+1}$ | 10. $s_n = \frac{n^2+2}{n} - \frac{n^2}{n+4}$ |
| 18. $s_n = (-1)^n \cos(n)$ | 4. $s_n = \frac{2n-1}{3n+1}$ | 11. $s_n = \frac{3^n+5}{1+3^n}$ |
| 19. $s_n = 3 + (-1)^n$ | 5. $s_n = \frac{4n}{\sqrt{4n^2+1}}$ | 12. $s_n = \frac{n+8}{1+\sqrt{n}}$ |
| 20. $s_n = \frac{n^2}{n+1}$ | 6. $s_n = \left(1 + \frac{1}{n}\right)^n$ | 13. $s_n = 2^{-n} + \left(\frac{3}{2}\right)^{-n}$ |
| 21. $s_n = (-1)^n \sqrt{n}$ | 7. $s_n = \frac{3n^2-1}{5n^2+1}$ | |
| 22. $s_n = \frac{n^2-n}{n!}$ | | |
| 23. $s_n = \frac{2n}{n+1}$ | | |

V. 24. $s_n = \frac{n}{2^n}$, Calcular, si existe

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| 1.- $\lim_{n \rightarrow \infty} \left(\frac{n^2+2}{n} - \frac{n^2}{n+4} \right)$ | 2.- $\lim_{n \rightarrow \infty} \frac{(2n-3)^3(3n-2)}{n^5+7}$ |
| 3.- $\lim_{n \rightarrow \infty} \left(\frac{n^2+2}{n} - \frac{n^2}{n+4} \right)$ | 4.- $\lim_{n \rightarrow \infty} \frac{3n^2+5n+4}{2+n^2}$ |
| 5.- $\lim_{n \rightarrow \infty} \frac{n^2-1}{n+1}$ | 6.- $\lim_{n \rightarrow \infty} \frac{4n^2+2n+2}{2n^3+3n+4}$ |
| 7.- $\lim_{n \rightarrow \infty} \frac{1+(-1)^4}{n}$ | 8.- $\lim_{n \rightarrow \infty} \frac{3^n+1}{3^n}$ |
| 9.- $\lim_{n \rightarrow \infty} \sin n\pi$ | 10.- $\lim_{n \rightarrow \infty} \sqrt[n]{n \cdot \frac{3^n}{4^n}}$ |
| 11.- $\lim_{n \rightarrow \infty} [1 + (-3)^n]$ | 12.- $\lim_{n \rightarrow \infty} (\sqrt{n+\sqrt{n}} - \sqrt{n-\sqrt{n}})$ |
| 13.- $\lim_{n \rightarrow \infty} \frac{1}{4^n}$ | 14.- $\lim_{n \rightarrow \infty} \sqrt{4^n + 7^n}$ |

15.- $\lim_{n \rightarrow \infty} \sqrt[n]{3^n}$

16.- $\lim_{n \rightarrow \infty} \left[\sqrt{n^2 + n} - n \right]$

17.- $\lim_{n \rightarrow \infty} \sqrt[n]{\frac{3}{4n^5}}$

18.- $\lim_{n \rightarrow \infty} \frac{\sqrt{n}}{\sqrt{n+1} + \sqrt{n}}$

19.- $\lim_{n \rightarrow \infty} \left(\sqrt[n]{2n} + \sqrt[n]{n^4} \right)$

20.- $\lim_{n \rightarrow \infty} \left(\sqrt[n]{5n} + \sqrt[n]{n^8} \right)$

21.- $\lim_{n \rightarrow \infty} \frac{2^n + 3^n}{5^n}$

22.- $\lim_{n \rightarrow \infty} \frac{2^n + 3 \cdot 5^{n+1}}{2^{2n} - 5^n}$

23.- $\lim_{n \rightarrow \infty} \frac{n \cdot 2^{n+1} + 1}{3^n}$

24.- $\lim_{n \rightarrow \infty} \frac{3^{n+1} + \operatorname{sen} \frac{n\pi}{4}}{3^n}$

25.- $\lim_{n \rightarrow \infty} \frac{5^n - 3^n}{5^n + 3^n}$

26.- $\lim_{n \rightarrow \infty} \frac{1 + 2^2 + \dots + n^2}{5n^3 + n + 1}$

27.- $\lim_{n \rightarrow \infty} \frac{2^n + (-1)^n}{5^n}$

28.- $\lim_{n \rightarrow \infty} \frac{1 + \frac{1}{2} + \frac{1}{2} + \frac{1}{4} + \dots + \frac{1}{2^n}}{1 + \frac{1}{3} + \frac{1}{9} + \dots + \frac{1^n}{3}}$

29.- $\lim_{n \rightarrow \infty} \frac{n \cdot 4^{n+1}}{5^n}$

30.- $\lim_{n \rightarrow \infty} \frac{n + \operatorname{sen} \left(\frac{n\pi}{2} \right)}{2n + 1}$

31.- $\lim_{n \rightarrow \infty} \frac{6n + 1}{6n}$

32 $\lim_{n \rightarrow \infty} \left(\frac{1}{n^2} + \frac{2}{n^2} + \dots + \frac{n+1}{n^2} \right)$

33.- $\lim_{n \rightarrow \infty} \left[\sqrt[n]{n+2} \right] - \sqrt[n]{n}$

34.- $\lim_{n \rightarrow \infty} \left(\frac{n}{n+1} \right)^n$

35.- $\lim_{n \rightarrow \infty} n \left(1 - \sqrt[n]{1 - \frac{1}{n}} \right)$

36.- $\lim_{n \rightarrow \infty} \left(\frac{2n^2}{2n-1} - \frac{n^2}{n+5} \right)$

37.- $\lim_{n \rightarrow \infty} \left(1 + \frac{2}{n} \right)^{2n}$

38.- $\frac{1 - \left(1 - \frac{1}{n} \right)^3}{1 - \left(1 - \frac{1}{n} \right)^2}$

39.- $\lim_{n \rightarrow \infty} \left(\frac{n^2 + 4n + 6}{n^2 + 4n + 4} \right)^{(n+2)(n+2)}$

40.- $\lim_{n \rightarrow \infty} \sqrt[n]{5^n + 3^n}$

41.- $\lim_{n \rightarrow \infty} \left[\left(\frac{1 + n^2}{n^2} \right)^{n+1} \right]^{n+1}$

42.- $\lim_{n \rightarrow \infty} -$

43.- $\lim_{n \rightarrow \infty} \left(\frac{an+b}{an+c} \right)^n$

44.- $\lim_{n \rightarrow \infty} \frac{\sqrt{n + \sqrt{n + \sqrt{n}}}}{\sqrt{n+1}}$

45.- $\lim_{n \rightarrow \infty} \left[\left(\frac{1+n^2}{n^2} \right)^{\frac{n}{3}+2} \right]$

46.- $\lim_{n \rightarrow \infty} \left(1 + \frac{5n}{2n^2 - n + 2} \right)^{6n-7}$

47.- $\lim_{n \rightarrow \infty} \frac{\sqrt{n + \sqrt[3]{n + \sqrt[4]{n}}}}{\sqrt{2n+1}}$

48.- $\lim_{n \rightarrow \infty} \left(\frac{1}{k} + \frac{1}{n} \right)^{k \cdot n}, k > 1$