



Nombre y Apellido:
Número de cédula:
Sección especial

Matemáticas 40
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TAREA. Series numericas

1. En caso de existir, calcular la suma de las siguientes series:

a)

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

b)

$$\sum_{n=1}^{\infty} \frac{1}{2n(n+1)}$$

c)

$$2 + \frac{2}{3} + \frac{2}{9} + \dots$$

d)

$$0,628 + 0,000628 + \dots + \frac{628}{(1000)^n} + \dots$$

e)

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

f)

$$\sum_{n=3}^{\infty} \frac{1}{4n^2 - 1}$$

g)

$$\sum_{n=2}^{\infty} \frac{1}{3^{n-1}} + \frac{1}{4^{n-1}}$$

h)

$$\sum_{n=3}^{\infty} \frac{2^n - 1}{4^n}$$

i)

$$\sum_{n=1}^{\infty} \left(\frac{e}{n}\right)^n$$

j)

$$1 + e^{-1} + e^{-2} + \dots + e^{-n} + \dots$$

k)

$$\sum_{n=1}^{\infty} (\sqrt{2})^{1-n}$$

l)

$$\sum_{n=1}^{\infty} \ln\left(\frac{n+1}{n}\right)$$

m)

$$\sum_{n=0}^{\infty} \frac{4}{16n^2 - 8n - 3}$$

n)

$$\sum_{n=1}^{\infty} \left(\frac{\pi}{e}\right)^n$$

ñ)

$$\sum_{n=1}^{\infty} \frac{2n+1}{[n(n+1)]^2}$$

o)

$$\sum_{n=1}^{\infty} \frac{1+n}{3^n} - \sum_{n=1}^{\infty} \frac{(-1)^{n+1} + n}{3^n}$$

p)

$$\sum_{n=0}^{\infty} \frac{3 \cdot 3^n + 4 \cdot 2^n}{2^n 3^n}$$

q)

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

r) Consiga dos series geométricas convergentes tales que su suma sea 2 y su diferencia sea 1

2. Estudiar el carácter de las siguientes series de términos positivos:

1

$$\sum_{n=1}^{\infty} \frac{n!}{1 \cdot 3 \cdot 5 \cdots (2n-1)}$$

2

$$\sum_{n=1}^{\infty} \frac{\ln(n+1)}{(n+1)^3}$$

3

$$\sum_{n=1}^{\infty} \left(\frac{\sqrt{n+5}}{\sqrt{4n+2}} \right)^{n^2+1}$$

4

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

5

$$\sum_{n=1}^{\infty} n e^{-n^2}$$

6

$$\sum_{n=1}^{\infty} \operatorname{sen}^2 \left(\frac{1}{n} \right)$$

7

$$\sum_{n=1}^{\infty} \frac{2^n + 2n}{e^{2n} - n}$$

8

$$\sum_{n=1}^{\infty} \frac{\sqrt{2n^2+1} + \sqrt[3]{n^2+1}}{\sqrt{n^5+3}}$$

9

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

10

$$\sum_{n=2}^{\infty} \frac{n^2 + 1}{n \ln n}$$

11

$$\sum_{n=2}^{\infty} \frac{1}{n \ln n + \sqrt{\ln^3 n}}$$

12

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

13

$$\sum_{n=1}^{\infty} \left(\frac{n^2 - 4n + 5}{n^2 + 5n - 3} \right)^{n^2-n+1}$$

14

$$\sum_{n=1}^{\infty} \frac{1}{n\sqrt[3]{n} - \sqrt{n}}$$

15

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

16

$$\sum_{n=1}^{\infty} \frac{\sqrt{n+1} + \operatorname{sen}\left(\frac{1}{n}\right)}{\sqrt[3]{n^2+1}}$$

17

$$\sum_{n=1}^{\infty} \left[n \operatorname{sen}\left(\frac{1}{n}\right) \right]^2$$

18

$$\sum_{n=1}^{\infty} \frac{n^2}{e^n}$$

19

$$\sum_{n=1}^{\infty} \frac{\sqrt[n]{2}}{n^2}$$

20

$$\sum_{n=1}^{\infty} \frac{\sqrt{2n^2+1} - \sqrt[3]{n+1}}{\sqrt{n^5+2}}$$

21

$$\sum_{n=2}^{\infty} \frac{n+1}{n(\ln n)^n}$$

22

$$\sum_{n=1}^{\infty} \left(\frac{1}{2} \right)^n \left(\frac{n-1}{2n+1} \right)$$

23

$$\sum_{n=1}^{\infty} \sqrt{n} - \sqrt{n+1}$$

24

$$\sum_{n=1}^{\infty} \operatorname{tg} \frac{1}{n\sqrt{n}}$$

25

$$\sum_{n=1}^{\infty} \frac{5^n (n!)^2}{(n+1)^{n+1} (n+2)^{n+3}}$$

26

$$\sum_{n=3}^{\infty} \frac{1}{n(\ln n)^p}$$

27

$$\sum_{n=1}^{\infty} \frac{\operatorname{sen}^2\left(\frac{1}{n}\right)}{n}$$

28

$$\sum_{n=1}^{\infty} \frac{n^2 - 4n + 5}{n^2 + 5n - 3}$$

29

$$\sum_{n=1}^{\infty} \frac{1}{n(n+1)(n+2)}$$

30

$$\sum_{n=2}^{\infty} \frac{\ln n}{e^n}$$

31

$$\sum_{n=1}^{\infty} \frac{1}{n2^n}$$

32

$$\sum_{n=1}^{\infty} \frac{n}{n^4 + 2n^2 + 1}$$

33

$$\sum_{n=2}^{\infty} \frac{\ln n}{n \ln^2 n + 1}$$

34

$$\sum_{n=1}^{\infty} \sqrt{n} \operatorname{sen} \left(\frac{1}{n\sqrt[3]{n^2}} \right)$$

35

$$\sum_{n=1}^{\infty} \frac{2 \cdot 4 \cdot 6 \cdots 2n}{(2n)!} n^n$$

36

$$\sum_{n=1}^{\infty} \left(\frac{n}{n+1} \right)^n$$

37

$$\sum_{n=1}^{\infty} \left(\frac{n^2 + 5n + 5}{n^2 + 5n - 3} \right)^{n^3 - n + 1}$$

38

$$\sum_{n=1}^{\infty} \frac{2^{n+1} n!}{(2n-1)!}$$

39

$$\sum_{n=1}^{\infty} \frac{3^n + 5}{4^n + n^2}$$

40

$$\sum_{n=1}^{\infty} \frac{2^n + 2n}{e^{2n} - n}$$

41

$$\sum_{n=1}^{\infty} \frac{1}{2^n} \operatorname{tg} \frac{\pi}{2^n}$$

42

$$\sum_{n=1}^{\infty} \sqrt{\left(\frac{an+3}{n}\right)^n}, \quad a > 0$$

43

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

44

$$\sum_{n=1}^{\infty} \frac{n^n}{2^{n-1}}$$

45

$$\sum_{n=1}^{\infty} \frac{(n!)^2}{(2n)!}$$

46

$$\sum_{n=1}^{\infty} \left(\operatorname{tg} \frac{1}{n} - \operatorname{sen} \frac{1}{n} \right)$$

3. Estudiar el carácter de las siguientes series, indicando en caso de convergencia si esta es absoluta o condicional:

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

2 $\sum_{n=1}^{\infty} (-1)^{n+1} \frac{2^n}{n!}$

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

4 $\sum_{n=2}^{\infty} \frac{(-1)^n}{n\sqrt{\ln n}}$

5 $\sum_{n=1}^{\infty} (-1)^{n+1} \frac{n+1}{n\sqrt{n}}$

6 $\sum_{n=2}^{\infty} (-1)^{n+1} \frac{(n-1)^2}{n^6}$

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

$$8. \sum_{n=1}^{\infty} (-1)^n \frac{3 \cdot 5 \cdot 7 \cdots (2n+1)}{2 \cdot 5 \cdot 8 \cdots (3n-1)}$$

$$9. \sum_{n=1}^{\infty} (-1)^{n-1} \frac{5n^3 - 1}{3n^2 + 2}$$

$$10. \sum_{n=1}^{\infty} (-1)^n \frac{\sqrt{3n+1}}{5n+3}$$

$$11. \sum_{n=1}^{\infty} (-1)^n \frac{n!}{(n+1)^5}$$

$$12. \sum_{n=1}^{\infty} (-1)^n \frac{n^2 + 3}{(2n-5)^2}$$

$$13. \sum_{n=1}^{\infty} (-1)^{n+1} \frac{\ln n}{n(\ln^2 n + 1)}$$

$$14. \sum_{n=1}^{\infty} (-1)^{n-1} \frac{\ln(n+1)}{n+1}$$

$$15. \sum_{n=1}^{\infty} (-1)^n \left[\frac{\sqrt{n+2}}{\sqrt{2n+1}} \right]^{n^2+n+1}$$

$$16. \sum_{n=1}^{\infty} (-1)^n \frac{10^{2n}}{(2n-1)!}$$

$$17. \sum_{n=1}^{\infty} (-1)^n \frac{8n^2 - 7}{e^n (n+1)^2}$$

$$18. \sum_{n=1}^{\infty} (-1)^n \frac{\operatorname{sen}(n\pi/2)}{n^2}$$

$$19. \sum_{n=1}^{\infty} (-1)^{n+1} \frac{n^2}{e^n}$$

$$20. \sum_{n=1}^{\infty} (-1)^{n+1} \frac{n^4}{2^n}$$

$$21. \sum_{n=1}^{\infty} \frac{(-3)^{n+1}}{n^2}$$

$$22. \sum \frac{(-1)^{n+1}}{\sqrt{n+1} + \sqrt{n}}$$

$$23. \sum_{n=1}^{\infty} (-1)^{n+1} \frac{\operatorname{sen} n}{n\sqrt{n}}$$

$$24. \sum_{n=1}^{\infty} (-1)^n \frac{1+3^n}{1+2^n}$$

$$25. \sum_{n=1}^{\infty} (-1)^n \sqrt{2n-1} \operatorname{sen}\left(\frac{1}{\sqrt{n^3}}\right)$$

$$26. \sum_{n=1}^{\infty} (-1)^{n+1} \sqrt{n^3} \frac{\operatorname{sen}(n\pi/2)}{n}$$

$$27. \sum_{n=1}^{\infty} (-1)^n \left(\frac{n-1}{n+1} \right)^{n(n-1)}$$

$$28. \sum (-1)^{n-1} \frac{n^{n+\frac{1}{n}}}{(n+\frac{1}{n})^n}$$

$$29. \sum_{n=1}^{\infty} (-1)^n \frac{3^n}{n(2^n + 1)}$$

$$30. \sum_{n=1}^{\infty} (-1)^n \frac{3^n n!}{n^{n+1} (n+1)^{n+2}}$$

$$31. \sum_{n=1}^{\infty} (-1)^n \frac{2^{3n}}{7^n}$$

$$32. \sum_{n=1}^{\infty} \frac{(-1)^n}{2^n} \operatorname{tg} \frac{\pi}{2^n}$$

$$33. \sum_{n=2}^{\infty} (-1)^n \frac{\ln n}{n(\ln^2 n + 1)}$$

$$34. \sum_{n=1}^{\infty} \frac{(-1)^n}{n^{\frac{1}{n}}}$$

$$35. \sum_{n=2}^{\infty} (-1)^n \frac{(3n-1)\ln n}{(\sqrt{2})^n \ln(n+1)}$$