Folha de exercícios 1

1.

a) $\sum_{n=1}^{+\infty} n(n+1)x^n \quad , \quad a_n = n(n+1)$

centro $c = 0$

Raio de convergência : $R = \frac{1}{L}$

$$L = \lim_{n \to +\infty} \left| \frac{a_{n+1}}{a_n} \right| = \lim_{n \to +\infty} \left| \frac{\cancel{(n+1)}(n+2)}{n\cancel{(n+1)}} \right| =$$

$$= \lim_{n \to +\infty} \frac{n+2}{n} = 1$$

$$R = \frac{1}{1} = 1$$

Intervalo de convergência: $]c-R, c+R[\; = \;]-1,1[$

$\boxed{x=-1}$ $\sum_{n=1}^{+\infty} \underbrace{n(n+1)}_{a_n}(-1)^n$

Como $\lim_{n \to +\infty} a_n = +\infty$, então é divergente

$\boxed{x=1}$

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

$\lim_{n \to +\infty} n(n+1) = +\infty$, logo é divergente

$$D = \;]-1,1[$$

b) $\sum_{n=1}^{+\infty} \frac{(2x)^n}{(n-1)!} = \sum_{n=1}^{+\infty} \frac{1}{(n-1)!} (2x)^n \quad , a_n = \frac{1}{(n-1)!}$

Centro $c = 0$

Raio de convergência : $R = \frac{1}{L}$

$L = \lim_{n \to +\infty} \left| \frac{a_{n+1}}{a_n} \right| = \lim_{n \to +\infty} \left| \frac{\frac{1}{n!}}{\frac{1}{(n-1)!}} \right| =$

$= \lim_{n \to +\infty} \left| \frac{(n-1)!}{n!} \right| = \lim_{n \to +\infty} \frac{\cancel{(n-1)!}}{n\cancel{(n-1)!}} = \lim_{n \to +\infty} \frac{1}{n} =$

$= 0$

$R = \frac{1}{0^+} = +\infty$

$D = \mathbb{R}$

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

centro $c = 0$

Raio de convergência: $R = \frac{1}{L}$

$L = \lim_{n \to +\infty} \left| \frac{a_{n+1}}{a_n} \right| = \lim_{n \to +\infty} \left| \frac{\frac{(-1)^n}{n+1}}{\frac{(-1)^{n-1}}{n}} \right| =$

$= \lim_{n \to +\infty} \frac{(-1)^n \cdot n}{(-1)^{n-1}(n+1)} = \lim_{n \to +\infty} \frac{n}{n+1} = 1$

$R = \frac{1}{1} = 1$

Intervalo de convergência: $]-1, 1[$

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

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

sempre ímpar

Critério do Limite

$-\frac{1}{n+1} < \frac{1}{n+1}$ $\longrightarrow$ são da mesma natureza

Como $\sum_{n=1}^{+\infty} \frac{1}{n+1}$ é divergente, então $\sum_{n=1}^{+\infty} -\frac{1}{n+1}$ é divergente.

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

Critério de Leibniz

Considerando $a_n = \frac{1}{n+1} > 0, \ n \in \mathbb{N}$

$\lim_{n \to +\infty} a_n = 0$

$a_{n+1} = \frac{1}{n+2} < \frac{1}{n+1} = a_n$

Logo é simplesmente convergente

$D =]-1, 1]$

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

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

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

centro da série $c = \frac{3}{2}$

Raio de convergência: $R = \frac{1}{L}$

$$L = \lim_{n \to +\infty} \left| \frac{a_{n+1}}{a_n} \right| = \lim_{n \to +\infty} \left| \frac{\frac{2^n}{n+3}}{\frac{2^{n-1}}{n+2}} \right| =$$

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

$$R = \frac{1}{2}$$

Intervalo de convergência: $\left] c - R , c + R \right[= \left] \frac{3}{2} - \frac{1}{2} , \frac{3}{2} + \frac{1}{2} \right[=$

$$= \left] \frac{2}{2} , \frac{4}{2} \right[= \left] 1 , 2 \right[$$

$\boxed{x = 1}$ $\displaystyle\sum_{n=1}^{+\infty} \frac{(2-3)^n}{2n+4} = \sum_{n=1}^{+\infty} \frac{(-1)^n}{2(n+2)} = \frac{1}{2} \sum_{n=1}^{+\infty} \frac{(-1)^n}{n+2}$

- Série dos módulos

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

Considerando a série $\displaystyle\sum_{n=1}^{+\infty} \frac{1}{n}$ uma série de Dirichlet divergente

$(\alpha = 1)$ e que $\displaystyle\sum_{n=1}^{+\infty} \frac{1}{n+2}$ tem a mesma natureza, então

$\displaystyle\sum_{n=1}^{+\infty} \frac{1}{n+2}$ é divergente

- Critério de Leibnitz

$$a_n = \frac{1}{n+2} > 0 \ , \ \lim_{n \to +\infty} a_n = 0 \ , \ a_{n+1} = \frac{1}{n+3} < \frac{1}{n+2} = a_n$$

Logo, é simplesmente convergente

$\boxed{x=2}$

$$\sum_{n=1}^{+\infty} \frac{(4-3)^n}{2n+4} = \sum_{n=1}^{+\infty} \frac{1}{2(n+2)} = \frac{1}{2} \sum_{n=1}^{+\infty} \underbrace{\frac{1}{n+2}}_{\text{divergente}}$$

$$D = [1, 2[$$

e) $\displaystyle\sum_{n=1}^{+\infty} \frac{n^2}{n!} x^n$

centro da série $c = 0$

Raio de convergência: $R = \dfrac{1}{L}$

$$L = \lim_{n \to +\infty} \left| \frac{a_{n+1}}{a_n} \right| = \lim_{n \to +\infty} \left| \frac{\frac{(n+1)^2}{(n+1)!}}{\frac{n^2}{n!}} \right| =$$

$$= \lim_{n \to +\infty} \frac{n!(n+1)^2}{(n+1)!\, n^2} = \lim_{n \to +\infty} \frac{\cancel{n!}(n+1)^2}{(n+1)\cancel{n!}\, n^2} =$$

$$= \lim_{n \to +\infty} \frac{(n+1)^2}{(n+1)\, n^2} = \lim_{n \to +\infty} \frac{n+1}{n^2} = \frac{1}{+\infty} = 0$$

$$R = \frac{1}{0^+} = +\infty$$

$$D = \mathbb{R}$$

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

centro da série $c = 2$

Raio de convergência: $R = \dfrac{1}{L}$

$$L = \lim_{n \to +\infty} \left| \frac{a_{n+1}}{a_n} \right| = \lim_{n \to +\infty} \left| \frac{\frac{(n+1)!}{n}}{\frac{n!}{n-1}} \right| =$$

$$= \lim_{n \to +\infty} \frac{(n-1)(n+1)!}{n \cdot n!} = \lim_{n \to +\infty} \frac{(n-1)(n+1)\cancel{n!}}{n \cdot \cancel{n!}} =$$

$$= \lim_{n \to +\infty} \frac{n^2-1}{n} = +\infty$$

$R = \frac{1}{+\infty} = 0$

$$\sum_{n=2}^{+\infty} \frac{n!\,(2-2)^n}{n-1} = \sum_{n=2}^{+\infty} 0 = 0$$

$D = \{2\}$

absolutamente convergente

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

centro da série $c = -2$

Raio de convergência: $R = \frac{1}{L}$

$$L = \lim_{n \to +\infty} \left| \frac{a_{n+1}}{a_n} \right| = \lim_{n \to +\infty} \left| \frac{\frac{\ln(n+1)}{n+1}}{\frac{\ln n}{n}} \right| =$$

$$= \lim_{n \to +\infty} \frac{n \ln(n+1)}{(n+1)\ln n} = \lim_{n \to +\infty} \frac{(n \ln(n+1))'}{((n+1)\ln n)'} =$$

Regra de Cauchy

$$= \lim_{n \to +\infty} \frac{\frac{1}{n+1} n + \ln(n+1)}{\frac{1}{n}(n+1) + \ln(n)} = \lim_{n \to +\infty} \frac{1 - \frac{1}{n+1} + \ln(n+1)}{1 + \frac{1}{n} + \ln(n)} =$$

Regra de Cauchy

$$= \lim_{n \to +\infty} \frac{\left(1 - \frac{1}{n+1} + \ln(n+1)\right)'}{\left(1 + \frac{1}{n} + \ln(n)\right)'} = \lim_{n \to +\infty} \frac{\frac{1}{(n+1)^2} + \frac{1}{n+1}}{-\frac{1}{n^2} + \frac{1}{n}} =$$

$$= \lim_{n \to +\infty} \frac{\frac{n+1+1}{(n+1)^2}}{\frac{n-1}{n^2}} = \lim_{n \to +\infty} \frac{n^2(n+2)}{(n-1)(n+1)^2} = 1$$

$R = \frac{1}{1} = 1$

Intervalo de convergência: $]c-R, c+R[=]-2-1, -2+1[=$

$=]-3, -1[$

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

- Série dos Módulos

$\sum_{n=1}^{+\infty} \frac{\ln n}{n}$ e $\sum_{n=1}^{+\infty} \frac{1}{n}$ são da mesma natureza

$\downarrow$ divergente

$\hookrightarrow$ série de Dirichlet $(\alpha = 1)$
Logo é divergente

- Critério de Leibniz

$a_n = \frac{\ln n}{n} > 0$, $\lim_{n\to+\infty} a_n = 0$

$a_{n+1} = \frac{\ln(n+1)}{n+1} < \frac{\ln n}{n} = a_n$

Logo é simplesmente convergente

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

Como vimos anteriormente, é divergente.

$D = [-3, -1[$

h) $\sum_{n=0}^{+\infty} \frac{3^n}{2+n^3} x^n$

Centro da série $c = 0$

Raio de convergência: $R = \frac{1}{L}$

$$L = \lim_{n\to+\infty} \left| \frac{a_{n+1}}{a_n} \right| = \lim_{n\to+\infty} \left| \frac{\frac{3^{n+1}}{2+(n+1)^3}}{\frac{3^n}{2+n^3}} \right| =$$

$$= \lim_{n\to+\infty} \frac{3^{\cancel{n+1}}(2+n^3)}{\cancel{3^n}(2+(n+1)^3)} = \lim_{n\to+\infty} \frac{3(2+n^3)}{2+(n+1)^3} = 3$$

$R = \frac{1}{3}$

Intervalo de convergência: $\left] -\frac{1}{3}, \frac{1}{3} \right[$

$\boxed{x = -\frac{1}{3}}$

$$\sum_{n=0}^{+\infty} \frac{3^n}{2+n^3}\left(-\frac{1}{3}\right)^n = \sum_{n=0}^{+\infty} \frac{3^n}{2+n^3}(-3)^{-n} =$$

$$= \sum_{n=0}^{+\infty} \frac{3^n}{2+n^3}(-1)^n\, 3^{-n} = \sum_{n=0}^{+\infty} \frac{(-1)^n}{2+n^3}$$

- Série dos módulos

$$\sum_{n=0}^{+\infty} \left|\frac{(-1)^n}{2+n^3}\right| = \sum_{n=0}^{+\infty} \frac{1}{2+n^3}$$

$$\sum_{n=0}^{+\infty} \frac{1}{2+n^3} \text{ e } \underbrace{\sum_{n=0}^{+\infty} \frac{1}{n^3}}_{} \text{ têm a mesma natureza}$$

série de Dirichlet com $\alpha = 3 > 1$

Logo é convergente.

Por isso, $\sum_{n=0}^{+\infty} \frac{1}{2+n^3}$ é convergente

- Critério de Leibniz

$$a_n = \frac{1}{2+n^3} > 0 \ , \ \lim_{n \to +\infty} a_n = 0$$

$$a_{n+1} = \frac{1}{2+(n+1)^3} < \frac{1}{2+n^3} = a_n$$

Logo é absolutamente convergente

$\boxed{x = \frac{1}{3}}$

$$\sum_{n=0}^{+\infty} \frac{3^n}{2+n^3}\left(\frac{1}{3}\right)^n = \sum_{n=0}^{+\infty} \frac{\cancel{3^n}}{2+n^3}\cancel{(3)^{-n}} = \sum_{n=0}^{+\infty} \frac{1}{2+n^3}$$

absolutamente convergente

$$D = \left[-\frac{1}{3}, \frac{1}{3}\right]$$

i) $\sum_{n=2}^{+\infty} \frac{x^{3n}}{\ln n} = \sum_{n=0}^{+\infty} \frac{1}{\ln n} x^{3n}$

centro da série $c = 0$

Raio de convergência : $R = \frac{1}{L}$

$$L = \lim_{n \to +\infty} \left| \frac{a_{n+1}}{a_n} \right| = \lim_{n \to +\infty} \left| \frac{\frac{1}{\ln(n+1)}}{\frac{1}{\ln n}} \right| =$$

$$= \lim_{n \to +\infty} \frac{\ln n}{\ln(n+1)} \underset{\text{Regra de Cauchy}}{=} \lim_{n \to +\infty} \frac{\frac{1}{n}}{\frac{1}{n+1}} = 1$$

Intervalo de convergência : $]-1, 1[$

$\boxed{x = -1}$ $\sum_{n=0}^{+\infty} \frac{(-1)^{3n}}{\ln n} = \sum_{n=0}^{+\infty} \frac{(-1)^n}{\ln n}$

- Série dos módulos

$$\sum_{n=0}^{+\infty} \left| \frac{(-1)^n}{\ln n} \right| = \sum_{n=0}^{+\infty} \frac{1}{\ln n}$$

$\underbrace{\sum_{n=0}^{+\infty} \frac{1}{\ln n}}$ e $\sum_{n=0}^{+\infty} \frac{1}{n}$ têm a mesma natureza

$\hookrightarrow$ série de Dirichlet com $\alpha = 1$, logo é divergente

Logo é divergente

- Critério de Leibniz

$$a_n = \frac{1}{\ln n} > 0, \quad \lim_{n \to +\infty} a_n = 0$$

$$a_{n+1} = \frac{1}{\ln(n+1)} < \frac{1}{\ln n} = a_n$$

Logo é simplesmente convergente

$\boxed{x=1}$

$$\sum_{n=0}^{+\infty} \frac{1^{3n}}{\ln n} = \sum_{n=0}^{+\infty} \frac{1}{\ln n} \to \text{divergente, como já foi visto}$$

$$D = [-1, 1[$$

j) $$\sum_{n=1}^{+\infty} \frac{(-1)^n}{n\,6^n} (3x-2)^n = \sum_{n=1}^{+\infty} \frac{(-1)^n}{n\,6^n} \left(3\left(x-\frac{2}{3}\right)\right)^n =$$

$$= \sum_{n=1}^{+\infty} \frac{(-1)^n}{n\,6^n} 3^n \left(x-\frac{2}{3}\right)^n = \sum_{n=1}^{+\infty} \frac{(-1)^n}{n\,2^n} \left(x-\frac{2}{3}\right)^n$$

centro da série $c = \frac{2}{3}$

Raio de convergência : $R = \frac{1}{L}$

$$L = \lim_{n\to+\infty} \left|\frac{a_{n+1}}{a_n}\right| = \lim_{n\to+\infty} \left|\frac{\frac{1}{(n+1)\,2^{n+1}}}{\frac{1}{n\,2^n}}\right| =$$

$$= \lim_{n\to+\infty} \left|\frac{n\,2^n}{(n+1)\,2^{n+1}}\right| = \lim_{n\to+\infty} \frac{n}{(n+1)2} = \frac{1}{2}$$

$$R = \frac{1}{1/2} = 2$$

Intervalo de convergência: $]c-R, c+R[= \left]\frac{2}{3} - \frac{2}{1_{(3)}}, \frac{2}{3} + \frac{2}{1_{(3)}}\right[=$

$$= \left]\frac{2}{3} - \frac{6}{3}, \frac{2}{3} + \frac{6}{3}\right[= \left]-\frac{4}{3}, \frac{8}{3}\right[$$

$\boxed{x = -\frac{4}{3}}$

$$\sum_{n=1}^{+\infty} \frac{(-1)^n}{n\,2^n} \left(-\frac{4}{3} - \frac{2}{3}\right)^n = \sum_{n=1}^{+\infty} \frac{(-1)^n}{n\,2^n} \left(-\frac{6}{3}\right)^n =$$

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

$$= \sum_{n=1}^{+\infty} \frac{(-1)^{2n}}{n} = \underbrace{\sum_{n=1}^{+\infty} \frac{1}{n}}_{\text{série de Dirichlet com } \alpha = 1 \to \text{divergente}} \to \text{divergente}$$

$\boxed{x = \frac{8}{3}}$ $\sum_{n=1}^{+\infty} \frac{(-1)^n}{n\,2^n} \left(\frac{8}{3} - \frac{2}{3}\right)^n = \sum_{n=1}^{+\infty} \frac{(-1)^n}{n\,\cancel{2^n}} \cancel{2^n} =$

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

- Série dos módulos

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

↳ série de Dirichlet com $\alpha = 1$
é divergente

Logo $\sum_{n=1}^{+\infty} \frac{(-1)^n}{n}$ é divergente

- Critério de Leibniz

$a_n = \frac{1}{n} > 0$, $\lim_{n \to +\infty} a_n = 0$

$a_{n+1} = \frac{1}{n+1} < \frac{1}{n} = a_n$

Logo, é simplesmente convergente

$D = \left] -\frac{4}{3}, \frac{8}{3} \right]$

k) $\sum_{n=0}^{+\infty} \frac{n+1}{2^n} (x-2)^n$

centro c da série $= 2$

Raio de convergência : $R = \frac{1}{L}$

$L = \lim_{n \to +\infty} \left| \frac{a_{n+1}}{a_n} \right| = \lim_{n \to +\infty} \left| \frac{\frac{n+2}{2^{n+1}}}{\frac{n+1}{2^n}} \right| =$

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

$R = \frac{1}{1/2} = 2$

Digitalizada com CamScanner

Intervalo de convergência: $]c-R, c+R[=]2-2, 2+2[=$

$]0, 4[$

$\boxed{x=0}$ $\sum_{n=0}^{+\infty} \frac{n+1}{2^n} (-2)^n = \sum_{n=0}^{+\infty} \frac{n+1}{\cancel{2^n}} (-1)^n \cancel{2^n} = \underbrace{\sum_{n=0}^{+\infty} (-1)^n (n+1)}_{\text{divergente}}$

$\boxed{x=4}$ $\sum_{n=0}^{+\infty} \frac{n+1}{2^n} (4-2)^n = \sum_{n=0}^{+\infty} \frac{n+1}{\cancel{2^n}} \cancel{2^n} = \underbrace{\sum_{n=0}^{+\infty} n+1}_{\text{divergente}}$

$D =]0, 4[$

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

Raio de convergência: $R = \frac{1}{L}$

$L = \lim_{n \to +\infty} \left| \frac{a_{n+1}}{a_n} \right| = \lim_{n \to +\infty} \left| \frac{\frac{(-2)^{n+1}}{\sqrt{2(n+1)+1}}}{\frac{(-2)^n}{\sqrt{2n+1}}} \right| =$

$= \lim_{n \to +\infty} \frac{\cancel{2}^{n+1} \sqrt{2n+1}}{\cancel{2^n} \sqrt{2n+3}} = \lim_{n \to +\infty} 2 \sqrt{\frac{2n+1}{2n+3}} =$

$= \lim_{n \to +\infty} \sqrt{\frac{2^2 (2n+1)}{2n+3}} = \lim_{n \to +\infty} \sqrt{\frac{8n+4}{2n+3}} = \lim_{n \to +\infty} \sqrt{\frac{8}{2}}$

$= \sqrt{4} = 2$

$R = \frac{1}{2}$

Intervalo de convergência: $]c-R, c+R[=$

$=]-\frac{1}{2}, \frac{1}{2}[$

$$\boxed{x = +\frac{1}{2}}$$

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

- Série dos módulos

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

$$\frac{1}{\sqrt{2n+1}} < \frac{1}{\sqrt{n}} \longrightarrow \text{série de Dirichlet, com } \alpha = \frac{1}{2} < 1$$

divergente

Logo é divergente

- Critério de Leibniz

$$a_n = \frac{1}{\sqrt{2n+1}} > 0, n \in \mathbb{N}, \quad \lim_{n \to +\infty} a_n = 0$$

$$a_{n+1} = \frac{1}{\sqrt{2n+3}} < \frac{1}{\sqrt{2n+1}} = a_n$$

Logo, é simplesmente convergente

$$\boxed{x = -\frac{1}{2}}$$

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

$$= \sum_{n=1}^{+\infty} \frac{1}{\sqrt{2n+1}} \longrightarrow \text{divergente}$$

$$D = \left] -\frac{1}{2}, \frac{1}{2} \right]$$