

1) Verifique a convergência (ou não) de:

$a) \sum \frac{1}{\sqrt{n(n+1)}(\sqrt{n+1} + \sqrt{n})}$	$b) \sum \frac{1}{\sqrt{n^2 + 4n}}$	$c) \sum \ln\left(\frac{n}{n+1}\right)$	$d) \sum \frac{1}{n \ln(n)}$	$e) \sum \frac{2^n}{5^{n-1}}$
$f) \sum (-1)^{n+1} \left(\frac{n+2}{n(n+1)}\right)$	$g) \sum \frac{1}{(n+1)2^{n+1}}$	$h) \sum \frac{n^2}{4n^3 + 1}$	$i) \sum \frac{(-1)^n}{n^2 + 2n}$	$j) \sum \left(\frac{2}{3}\right)^n$
$k) \sum \frac{1}{(n+1)\sqrt{\ln(n+1)}}$	$l) \sum \frac{1}{n + \sqrt{n+5}}$	$m) \sum \frac{2n+2}{3n+5}$	$n) \sum \sin\left(\frac{n\pi}{6}\right)$	$o) \sum \frac{1}{\sqrt{n}}$
$p) \sum \frac{n!}{1.3.5... (2n+1)}$	$q) \sum \frac{1}{n\sqrt{n^2 + 5}}$	$r) \sum \frac{n+1}{n^2 + 2}$	$s) \sum \left(\frac{n+1}{n^2}\right)^n$	$t) \sum \frac{1}{n^n}$
$u) \sum \frac{n}{n^3 + n^2 + n + 1}$	$v) \sum \frac{\arctg(n)}{n^2 + 1}$	$w) \sum \frac{\sin nt}{n^2}$	$x) \sum n e^{-n^2}$	$y) \sum \frac{1}{n 2^n}$
$z) \sum \frac{2}{(n+2)(n+4)}$	$aa) \sum \frac{e^{\arctg(n)}}{n^2 + 1}$	$ab) \sum \frac{n}{2n+5}$	$ac) \sum \frac{n+1}{n^2 2^n}$	$ad) \sum \frac{2^n}{n}$
$ae) \sum \frac{(-1)^n (n^2 + 1)}{n^3}$	$af) \sum \left(\frac{n}{2n+5}\right)^n$	$ag) \sum \frac{1}{\sqrt{n+5}}$	$ah) \sum \frac{n+1}{n 4^n}$	$ai) \sum \frac{1}{n 3^n}$
$aj) \sum \frac{n}{4n^3 + n + 1}$	$ak) \sum \frac{n!}{(n+2)!}$	$al) \sum \frac{1}{\sqrt{n^3 + 5}}$	$am) \sum \frac{\ln(n)}{n}$	$an) \sum n e^{-n}$
$ao) \sum \frac{n!}{2^n (n+2)!}$	$ap) \sum \left(\frac{n+1}{n^2 2^n}\right)^n$	$aq) \sum \frac{1}{n (\ln n)^n}$	$ar) \sum \frac{\sqrt{n}}{n^2 + 1}$	$as) \sum n^2 e^{-n}$
$at) \sum \frac{3^n}{2^n (n^2 + 2)}$	$au) \sum \frac{2n+1}{n^2 (n+1)^2}$	$av) \sum \frac{(-1)^n n^2}{n!}$	$aw) \sum \frac{(-1)^n 3^n}{n!}$	$ax) \sum \frac{1}{n^9}$
$ay) \sum \frac{n}{4n + n + 1}$	$az) \sum 2^n \left(\frac{n+1}{n^2}\right)^n$	$ba) \sum \frac{(-1)^n n!}{2^{n+1}}$	$bb) \sum \frac{1}{n+5}$	$bc) \sum \frac{2^{n-1}}{3^n}$
$bd) \sum \frac{(-1)^n}{(2n-1)!}$	$be) \sum \frac{(-1)^n n 2^n}{3^n}$	$bf) \sum \frac{ \sin n }{2^n}$	$bg) \sum \frac{(-1)^{n+1}}{n^3}$	$bh) \sum \frac{2^n}{(2n)!}$
$bi) \sum \frac{n^p}{(n-1)n(n+1)}$	$bj) \sum \frac{n + \ln n}{n^3 + 1}$	$bk) \sum \frac{2 + \cos n}{n^3}$	$bl) \sum \frac{\sqrt{n}}{n+4}$	$bm) \sum \frac{1 + 2^n}{1 + 3^n}$
$bn) \sum \frac{\arctg(n)}{n^3 + 1}$	$bo) \sum \frac{(-1)^n 2^n}{n!}$	$bp) \sum \frac{1}{n\sqrt{n^2 - 1}}$	$bq) \sum \frac{1}{4n+7}$	$br) \sum \frac{(-1)^n}{n^{2/3}}$
$bs) \sum \frac{2^{n-1}}{5^n (n+1)}$	$bt) \sum \frac{n!}{(n+2)^3}$	$bu) \sum \frac{(-1)^n n}{n^3 + 3}$	$bv) \sum \frac{3n+1}{2^n}$	$bw) \sum \frac{3^n}{n^2 + 2}$
$bx) \sum \frac{n^n + 3}{(2n-5)^n}$	$by) \sum \frac{(-1)^n n^4}{e^n}$	$bz) \sum \frac{(-1)^n n}{n^2 + 1}$		

Exercícios de CDI-II – Séries - Prof. Milton

2) Encontre a “Soma” das séries:

$$\begin{array}{lll} a) \sum \frac{1}{(2n-1)(2n+1)} & b) \sum \frac{2}{(4n-3)(4n+1)} & c) \sum \frac{2}{(2n+5)(2n+3)} \\ d) \sum \frac{5}{(5n+2)(5n+7)} & e) \sum \frac{1}{\sqrt{n+1}+\sqrt{n}} & f) \sum \frac{3n-4}{n^3+3n^2+2n} \end{array}$$

3) Verifique o domínio de convergência de:

$$\begin{array}{llll} a) \sum \frac{1.2.3... (2n-1)(-x)^n}{3.6.9...3n} & b) \sum \frac{n^4(x-1)^n}{e^n} & c) \sum \frac{n(x-5)^n}{n^2+1} & d) \sum \frac{x^n}{n} \\ e) \sum \frac{(n^n+3)(x+2)^n}{(2n-5)^n} & f) \sum \frac{2^n(x+1)^n}{n^2+1} & g) \sum \frac{n(x-1)^{2n}}{n^2+3} & h) \sum nx^n \\ i) \sum \frac{(3x)^n}{5^n(1+n^2)} & j) \sum \frac{2(x-5)^n}{n^2+3} & k) \sum \frac{\cos nx}{n^2+1} \end{array}$$

4) Desenvolver em séries de potências:

$$\begin{array}{llllll} a) \frac{1}{1+x} & b) \frac{1}{1+x^2} & c) \frac{1}{\sqrt{1+x}} & d) \frac{1}{\sqrt{1-x^2}} & e) \frac{\ln(1+x)}{x} & f) \ln\left(\frac{1+x}{1-x}\right) \\ g) \arcsen x & h) \arctg x & i) \sqrt[3]{1+x^2} & j) \frac{\cos x}{x^2} & k) e^{-x^2} & l) e^{3x} \\ m) \arccos x & n) \sen 2x & o) \cos 2x & p) x^2 \sen 2x & q) (1+3x)^a \end{array}$$

5) Calcule com erros $< 10^{-4}$:

$$\begin{array}{lll} a) \int_0^{1/2} x^2 \sen \sqrt{x} dx & b) \int_0^1 \frac{\sen x}{x} dx & c) \int_0^{1/2} x \sen x^3 dx \end{array}$$

Algumas Respostas:

- 1) **a)** conv. **b)** div. **c)** div.. **d)** div. **e)** conv. **f)** conv. **g)** conv. **h)** div.
i) conv. **j)** conv. **k)** div. **l)** div. **m)** div. **n)** div. **o)** div. **p)** conv.
q) conv. **r)** div. **s)** conv. **t)** conv. **u)** conv. **v)** conv. **w)** conv. **x)** conv.
y) conv. **z)** conv. **aa)** conv. **ab)** div. **ac)** conv. **ad)** div.. **ae)** conv. **af)** conv.
ag) div. **ah)** conv. **ai)** conv. **aj)** conv. **ak)** conv. **al)** conv. **am)** div. **an)** conv.
ao) conv. **ap)** conv. **aq)** conv. **ar)** conv. **as)** conv. **at)** conv. **au)** conv. **av)** conv.
aw) conv. **ax)** conv. **ay)** div. **az)** conv. **ba)** div. **bb)** div. **bc)** conv. **bd)** conv.
be) conv. **bf)** conv. **bg)** conv. **bh)** conv. **bi)** div. para $p \geq 2$ **bj)** conv. **bk)** conv.
bl) div. **bm)** conv. **bn)** conv. **bo)** conv. **bp)** conv. **bq)** div. **br)** conv. **bs)** conv.
bt) div. **bu)** conv. **bv)** conv. **bw)** div. **bx)** conv. **by)** conv. **bz)** conv.

2) **a)** $1/2$, **b)** $1/2$, **c)** $1/5$, **d)** $1/7$, **e)** $S_n = \sqrt{n+1} - 1 \rightarrow \infty$, **f)** $1/2$,

3) **a)** $\{0\}$, **b)** $(1-e, 1+e)$, **c)** $[4, 6)$, **d)** $[-1, 1)$, **e)** $[-4, 0)$, **f)** $[-3/2, -1/2]$,
g) $(0, 2)$, **h)** $(-1, 1)$, **i)** $[-5/3, 5/3]$, **j)** $[4, 6]$, **k)** $(-\infty, \infty)$

- 4) *a)* $1 - x + x^2 - x^3 + x^4 - x^5 + x^6 - x^7 + x^8$
b) $1 - x^2 + x^4 - x^6 + x^8 - x^{10} + x^{12} - x^{14}$
c) $1 - \frac{1}{2}x + \frac{3}{8}x^2 - \frac{5}{16}x^3 + \frac{35}{128}x^4 - \frac{63}{256}x^5 + \frac{231}{1024}x^6 - \frac{429}{2048}x^7$
d) $1 - \frac{1}{2}x^2 + \frac{3}{8}x^4 - \frac{5}{16}x^6 + \frac{35}{128}x^8 - \frac{63}{256}x^{10} + \frac{231}{1024}x^{12}$
e) $1 - \frac{1}{2}x + \frac{1}{3}x^2 - \frac{1}{4}x^3 + \frac{1}{5}x^4 - \frac{1}{6}x^5 + \frac{1}{7}x^6 - \frac{1}{8}x^7$
f) $-1 + x - \frac{1}{2}x^2 + \frac{5}{12}x^3 - \frac{7}{24}x^4 + \frac{191}{720}x^5 - \frac{33}{160}x^6 + \frac{11779}{60480}x^7$
g) $x + \frac{1}{6}x^3 + \frac{3}{40}x^5 + \frac{5}{112}x^7 + \frac{35}{1152}x^9 + \frac{63}{2816}x^{11} + \frac{231}{13312}x^{13}$
h) $x - \frac{1}{3}x^3 + \frac{1}{5}x^5 - \frac{1}{7}x^7 + \frac{1}{9}x^9 - \frac{1}{11}x^{11} + \frac{1}{13}x^{13}$
i) $1 + \frac{1}{3}x^2 - \frac{1}{9}x^4 + \frac{5}{81}x^6 - \frac{10}{243}x^8 + \frac{22}{729}x^{10} - \frac{154}{6561}x^{12}$
j) $\frac{1}{x^2} - \frac{1}{2} + \frac{1}{24}x^2 - \frac{1}{720}x^4 + \frac{1}{40320}x^6 - \frac{1}{3628800}x^8 + \frac{1}{479001600}x^{10}$
k) $1 - x^2 + \frac{1}{2}x^4 - \frac{1}{6}x^6 + \frac{1}{24}x^8 - \frac{1}{120}x^{10} + \frac{1}{720}x^{12}$
l) $1 + 3x + \frac{9}{2}x^2 + \frac{9}{2}x^3 + \frac{27}{8}x^4 + \frac{81}{40}x^5 + \frac{81}{80}x^6 + \frac{243}{560}x^7$
m) $\frac{1}{2}\pi - x - \frac{1}{6}x^3 - \frac{3}{40}x^5 - \frac{5}{112}x^7 - \frac{35}{1152}x^9 - \frac{63}{2816}x^{11} - \frac{231}{13312}x^{13}$
n) $2x - \frac{4}{3}x^3 + \frac{4}{15}x^5 - \frac{8}{315}x^7 + \frac{4}{2835}x^9 - \frac{8}{155925}x^{11} + \frac{8}{6081075}x^{13}$
o) $1 - 2x^2 + \frac{2}{3}x^4 - \frac{4}{45}x^6 + \frac{2}{315}x^8 - \frac{4}{14175}x^{10} + \frac{4}{467775}x^{12}$
p) $2x^3 - \frac{4}{3}x^5 + \frac{4}{15}x^7 - \frac{8}{315}x^9 + \frac{4}{2835}x^{11} - \frac{8}{155925}x^{13}$
q) $1 + 3\alpha x + \frac{9}{2}\alpha(\alpha - 1)x^2 + \frac{9}{2}\alpha(\alpha - 1)(\alpha - 2)x^3$

- 5) *a)* 0,02365 *b)* 0,94608 *c)* 0,00624