1. Estude a convergência das séries:

$a)\ \sum_{n=1}^{\infty}(-1)^{n+1}\sin\frac{1}{n}$ $b)\ \sum_{n=2}^{\infty}(-1)^{n}\frac{n^3}{n^4+3}$ $c)\ \sum_{n=1}^{\infty}\frac{1}{n\sqrt{n}}$

$d)\ \sum_{n=1}^{\infty}\frac{1}{3n+1}$ $e)\ \sum_{n=3}^{\infty}\frac{\ln n}{n^2}$ $f)\ \sum_{n=1}^{\infty}\frac{\cos n}{n^2}$

$g)\ \sum_{n=1}^{\infty}\frac{1}{3^{n-1}+2}$ $h)\ \sum_{n=3}^{\infty}\frac{1}{\sqrt[n]{2}}$ $i)\ \sum_{n=1}^{\infty}\frac{\arctan n}{1+n^2}$

$j)\ \sum_{n=0}^{\infty}\frac{n+1}{(n+2)2^n}$ $k)\ \sum_{n=1}^{\infty}\frac{n+1}{\ln(n+2)}$ $l)\ \sum_{n=1}^{\infty}\frac{n}{1+n^2}$

$m)\ \sum_{n=0}^{\infty}\frac{n^5+4n^3+1}{2n^8+n^4+2}$ $n)\ \sum_{n=1}^{\infty}\frac{(-1)^{n+1}(n+1)}{3n}$ $0)\ \sum_{n=1}^{\infty}\frac{(-1)^{n+1}\sqrt{n}}{2n+1}$

$p)\ \sum_{n=1}^{\infty}\frac{(-1)^{n+1}\ln^2 n}{n}$ $q)\ \sum_{n=1}^{\infty}(-1)^{n+1}\sqrt{n}\arctan\frac{1}{n+1}$ $r)\ \sum_{n=1}^{\infty}\frac{1}{n}\sin\left(\frac{n\pi}{2}-\frac{\pi}{4}\right)$

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

2. Aproxime a soma da série s), da questão 1, com precisão de três casas decimais.

3. Mostre que a série $\sum_{n=0}^{\infty}\sum_{i=0}^{2^n}2^{-i}$ é divergente.

4. Seja $\sum_{n=0}^{\infty}a_n$ uma série e $R_n=\sum_{i=n+1}^{\infty}a_i$ o resto depois de n termos. Mostre que $\sum_{n=0}^{\infty}a_n$ é convergente se, e somente se, $\lim_{n\to\infty}R_n=0$.

5. Para que valores de p é convergente a série $\sum_{n=2}^{\infty}\frac{1}{n(\ln n)^p}$?

6. Para que valores de x é convergente as séries:

$a)\ \sum_{n=1}^{\infty}\frac{(-1)^{n-1}x^{2n-1}}{(2n-1)!}$ $b)\ \sum_{n=1}^{\infty}\frac{x^n}{\sqrt{n}}$

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