Folha 10B – Séries Numéricas (parte I).

1. Analisando a sucessão geradora de cada uma das seguintes séries, averigue se é possível concluir a divergência de alguma delas:

   (a) $\dfrac{1}{3}+\dfrac{\sqrt{2}}{4}+\dfrac{\sqrt{3}}{5}+\dfrac{2}{6}+\cdots$

   (b) $\dfrac{1}{3}+\dfrac{4}{5}+\dfrac{9}{7}+\dfrac{16}{9}+\cdots$

   (c) $1\operatorname{sen}1+2\operatorname{sen}\dfrac{1}{2}+3\operatorname{sen}\dfrac{1}{3}+4\operatorname{sen}\dfrac{1}{4}+\cdots$

   (d) $\Big(\dfrac{1}{2}+1\Big)+\Big(\dfrac{1}{4}+1\Big)+\Big(\dfrac{1}{8}+1\Big)+\cdots$

2. Estude a natureza de cada uma das seguintes séries numéricas:

   (a) $\displaystyle\sum_{n=0}^{+\infty}\frac{n2^n}{e^n}$; (b) $\displaystyle\sum_{n=2}^{+\infty}\frac{1}{\sqrt{n^2-1}}$; (c) $\displaystyle\sum_{n=1}^{+\infty}\frac{(n!)^2}{(2n)!}$;

   (d) $\displaystyle\sum_{n=0}^{+\infty}\frac{n^{1000}}{(1001)^n}$; (e) $\displaystyle\sum_{n=0}^{+\infty}\frac{1\times 3\times\cdots\times(2n+1)}{3\times 6\times\cdots\times(3n+3)}$; (f) $\displaystyle\sum_{n=1}^{+\infty}\frac{2n^2+1}{n^3+3n^2-1}$;

   (g) $\displaystyle\sum_{n=2}^{+\infty}\frac{\sqrt{n^2+n}}{\sqrt[3]{n^7-n}}$; (h) $\displaystyle\sum_{n=0}^{+\infty}\frac{1}{5+3n}$; (i) $\displaystyle\sum_{n=2}^{+\infty}\frac{\ln n}{2n^3-1}$;

   (j) $\displaystyle\sum_{n=1}^{+\infty}\frac{1}{3^n}\Big(\frac{n+1}{n}\Big)^{3n}$; (l) $\displaystyle\sum_{n=2}^{+\infty}\ln\Big(1+\frac{4}{n^2}\Big)$.