Prova 2 - Cálculo Diferencial e Integral II

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Questão 1. Avalie a convergência das integrais impróprias.

a) $\int_1^{+\infty} xe^{-x}dx$

Questão 2. Calcule a soma da série dada.

a) $\sum_{n=1}^{\infty} \pi^{-n}$

$$\lim_{n\to\infty} \left(\pi^{-n}\right) = ?$$
$$\pi^{-n} = e^{\ln\left(\pi^{-n}\right)}$$
$$e^{\ln\left(\pi^{-n}\right)} = e^{-n\ln(\pi)}$$
$$\lim_{n\to\infty} \left(e^{-n\ln(\pi)}\right) = \lim_{u\to -\infty} \left(e^{u}\right)$$
$$\lim_{u\to -\infty} \left(e^{u}\right) = 0$$
$$\lim_{n\to\infty} \left(\pi^{-n}\right) = 0$$

$$\sum_{n=1}^{\infty} \pi^{-n} = 0$$

b) $\sum_{k=0}^{\infty} \frac{1}{(3k+2)(3k+5)}$

$$\sum_{k=0}^{\infty} \frac{1}{(3k+2)(3k+5)} = ?$$
$$\frac{1}{(3k+2)(3k+5)} = \frac{a_0}{3k+2} + \frac{a_1}{3k+5}$$
$$\frac{1\cdot(3k+2)(3k+5)}{(3k+2)(3k+5)} = \frac{a_0(3k+2)(3k+5)}{3k+2} + \frac{a_1(3k+2)(3k+5)}{3k+5}$$