CÁLCULO DIFERENCIAL E INTEGRAL II
Laboratorio 11
Primavera 2021
Integrales impropias

1. Calcula la integral impropia o muestra que diverge:

   (a) $\int_1^\infty \dfrac{dx}{x(1+5x)}$.

   (b) $\int_{\ln 2}^\infty \dfrac{e^{-x}}{1-e^{-2x}}dx$.

   (c) $\int_0^\infty \dfrac{1}{e^x+e^{-x}}dx$.

   (d) $\int_{-\infty}^0 xe^{2x}\, dx$.

   (e) $\int_{-\infty}^\infty |x|\, e^{-x^2}dx$.

   (f) $\int_0^1 x\ln(x)dx$.

   (g) $\int_0^{\pi/2} \dfrac{dx}{1-\operatorname{sen}(x)}$.

   (h) $\int_0^1 \dfrac{e^x}{e^x-1}dx$.

   (i) $\int_0^1 \dfrac{4r}{\sqrt{1-r^4}}dr$.

   (j) $\int_1^{\cosh(t)} \dfrac{dx}{\sqrt{x^2-1}}$, $t \geq 0$.

   (k) $\int_0^2 \dfrac{dx}{\sqrt{|x-1|}}$.

   (l) $\int_a^b \dfrac{dx}{\sqrt{x-a}\sqrt{b-x}}$, $\quad a<b$ dados.

2. Demuestra que
$$\int_0^1 (\ln x)^n\, dx = (-1)^n n!$$

3. Utiliza algún criterio de convergencia para determinar si la integral impropia converge o diverge:

   (a) $\int_1^\infty \dfrac{2x^2+1}{x^4+2x+1}\, dx$.

   (b) $\int_2^\infty \dfrac{dx}{(1+x)\ln x}$.

   (c) $\int_1^\infty \dfrac{1}{1+x^{1/2}}dx$.

(d) $\int_2^\infty \frac{\sqrt{x^2+1}}{x} dx$.

(e) $\int_1^\infty \frac{x}{e^{2x}-1} dx$.

(f) $\int_0^\infty \frac{\tan^{-1} x}{1+x^4}\, dx$.

(g) $\int_0^\infty e^{-x^2}\, dx$.

(h) $\int_0^1 \frac{\operatorname{sen}(x)}{\sqrt{x}}\, dx$.

(i) $\int_0^1 e^{1/x}\, dx$.

(j) $\int_0^\infty \frac{|\operatorname{sen}(x)|}{x^{3/2}}\, dx$.

(k) $\int_3^\infty \frac{\ln x}{(x-3)^4}\, dx$.