① Enunciar en forma precisa el teorema fundamental del calculo

② Calcular $\int_1^3 \frac{1}{x^2-2x+5}\,dx$

$$\int_1^3 \frac{1}{(x-1)^2+4} = \frac{1}{2}\arctan\left(\frac{x-1}{2}\right)\Big|_1^3 = \frac{1}{2}\arctan(1) - \frac{1}{2}\arctan(0) = \frac{1}{2}\arctan(1)_{//}$$

$u = x-1$
$du = dx$

$$\int \frac{1}{x^2-2x+5}\,dx = \int \frac{1}{(x-1)^2+4}\,dx = \int \frac{1}{u^2+4}\,dx = \int \frac{1}{u^2+2^2}\,dx = \frac{1}{2}\arctan\left(\frac{u}{2}\right) = \frac{1}{2}\arctan\left(\frac{x-1}{2}\right) + C_{//}$$

③ Calcular la siguiente integral indefinida $\int x^2 \operatorname{sen}(x)\,dx$

$f(x) = x^2 \quad f'(x) = 2x$

$g(x) = -\cos(x) \quad g'(x) = \operatorname{sen}(x)$

$= -x^2 \cdot \cos(x) - \int -2x \cdot \cos(x)\,dx$

$= -x^2 \cdot \cos(x) + 2\int x \cdot \cos(x)\,dx$

$f(x) = x \quad f'(x) = 1$

$g(x) = \operatorname{sen}(x) \quad g'(x) = \cos(x)$

$= -x^2 \cdot \cos(x) + 2\left(x \cdot \operatorname{sen}(x) - \int \operatorname{sen}(x)\,dx\right)$

$= -x^2 \cdot \cos(x) + 2\left(x \cdot \operatorname{sen}(x) + \cos(x)\right)$

$= -x^2 \cdot \cos(x) + 2x \cdot \operatorname{sen}(x) + 2\cos(x) + C, \quad C \in \mathbb{R}$

④ Determinar el limite para las siguientes sucesiones

ⓐ $\lim_{n\to\infty} \frac{(-1)^n \ln(n)}{n^2} =$ $\quad a_n = (-1)^n \cdot \frac{\ln(n)}{n^2}$ $\quad a_n = (-1)^n \cdot b_n$

$b_n = \frac{\ln(n)}{n^2}$

encontramos $f(x)$ tal que $f(n) = b_n \;\; \forall n_0 \in \mathbb{N}$ $\therefore \lim_{x\to\infty} f(x) = \lim_{n\to\infty} b_n = 0$

$\therefore$ la sucesion a_n converge.

$$\lim_{x\to\infty} \frac{\ln(x)}{x^2} \overset{L'H}{=} \lim_{x\to\infty} \frac{\frac{1}{x}}{2x} = \lim_{x\to\infty} \frac{1}{2x^2} = 0$$

ⓑ $\lim_{n\to\infty} \frac{n}{e^n} =$

encontramos $f(x) = \frac{x}{e^x}$ tal que $f(n) = a_n \;\; \forall n \in \mathbb{N}$ $\therefore \lim_{x\to\infty} \frac{x}{e^x} \overset{L'H}{=} \lim_{x\to\infty} \frac{1}{e^x} = 0$ $\quad \therefore \lim_{x\to\infty} f(x) = 0 = \lim_{n\to\infty} a_n$ $\quad \therefore \left\{\frac{n}{e^n}\right\}$ converge

⑤ Determinar si la serie converge $\sum_{n=0}^{\infty} \frac{\cos^2(n)}{3^n}$

$$\lim_{n\to\infty} \sqrt[n]{\left|\frac{\cos^2(n)}{3^n}\right|} = \lim_{n\to\infty} \frac{\sqrt[n]{\cos^2(n)}}{3} = \nexists$$

te amo:)