Práctico 5, 6 (integrales)

24/6

(3) f cont en $[2,8]$ / $\int_2^8 f(x)\,dx = 20$

$\int_8^4 f(x)\,dx = 12$

a) Calcular $\int_2^4 f(x)\,dx$

b) Probar $\exists\, c \in [2,4]$ / $\cancel{f}\, F(c) = 16$

a) $\underbrace{\int_2^8 f(x)\,dx}_{20} = \underbrace{\int_2^4 f(x)\,dx}_{=?} + \underbrace{\overbrace{\int_4^8 f(x)\,dx}^{=-12}}_{-\int_8^4 f(x)\,dx}$

b) $\exists\, c \in [a,b]$ / $f'(c) = \dfrac{f(b)-f(a)}{b-a}$

$a = 2$

$b = 4$ $\quad \exists\, c \in [2,4]$ / $f'(c) = \dfrac{f(4)-f(2)}{4-2}$

$\int f'(c)\,dx = \int \dfrac{f(4)-f(2)}{4-2}\,dx$

$f(c) = \dfrac{1}{2} \underbrace{\int f(4) - f(2)\,dx}_{\longrightarrow \int f(4)\,dx - \int f(2)\,dx} = 16$

Barrow

$32 = \int_2^4 f(x)\,dx \overset{\downarrow}{=} F(4) - F(2)$

(7)

c) $$f(x) = \frac{x^2 - 3x + 1}{x\sqrt{x}}$$

Hallar $\int f(x)\,dx$

$$\int \frac{x^2-3x+1}{x\sqrt{x}}\,dx = \int \frac{x^2}{x\sqrt{x}}dx - 3\int \frac{x}{x\sqrt{x}}dx + \int \frac{1}{x\sqrt{x}}dx$$

$$= \int \frac{x}{\sqrt{x}}dx - 3\int \frac{1}{\sqrt{x}}dx + \int \frac{1}{x\sqrt{x}}dx$$

Resolver cada integral por separado resuelve el problema.

(Fuera del práctico) $\int \operatorname{sen}(x)\, e^{x}\, dx$

El problema se resuelve por partes.

(Usando) $\int f(x) g'(x).dx = f(x) g(x) - \int f'(x) g(x) dx$

Tomo $f(x) = \operatorname{sen}(x)$ $f' = \cos(x)$
$g(x) = e^x$ $g'(x) = e^x$

Luego hago partes otra vez y paso sumando $\int \operatorname{sen}(x) e^x dx$

(fuera del práctico) $\int e^{x^2}. x\, dx$ (C.V.)

$u = x^2$

$\int \frac{e^u}{2} du = \frac{e^u}{2} + K$ ← desarmo C.V

$du . u' = dx (x^2)' = 2x dx$

cambio variable $u = ?$

a) $\displaystyle\int \frac{1}{x} \cdot \operatorname{sen}^3(1+\log(x))\,dx$ pensarlo!

b) $\displaystyle\int_2^4 \frac{dx}{(2x^2+1)(x-1)}$

fracciones simples

b) $$\int \frac{dx}{(2x^2+1)(x-1)} = \int \frac{dx\,(mx+n)}{(2x^2+1)} + \int \frac{c\,dx}{(x-1)}$$

$$(mx+n)(x-1) + c(2x^2+1) = 1$$

$$mx^2 - mx + nx - n + 2cx^2 + c = 1$$

$$x^2(m+2c) + x(-m+n) + c - n = 1$$

$$\begin{cases} m+2c = 0 \\ -m+n = 0 \Rightarrow m = n \\ c-n = 1 \Rightarrow c - m = 1 \end{cases} \Rightarrow \begin{cases} m+2c = 0 \\ -m+c = 1 \end{cases}$$

$\hookrightarrow c = 1/3$

$$m = -2/3 = n$$

$$= -2/3 \underbrace{\int \frac{x+1}{2x^2+1}\,dx} + 1/3 \underbrace{\int \frac{dx}{x-1}}$$

$\hookrightarrow$ facil!

$$-2/3 \underbrace{\int \frac{x}{2x^2+1}\,dx} - 2/3 \underbrace{\int \frac{1}{2x^2+1}\,dx}$$

facil!

¿Parecida a que integral es? ¿Qué forma tiene esto?

compañero dice

cvi

$u = 2x^2+1$

$du = ?$

es útil?