Clase 5/01/2021

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Plan

- Recordatorio
- Teorema Fundamental del calculo
- Integrales cambio de variable
- Tarea

Teorema fundamental del calculo.

La derivada de la integral f(x) de la función es la propia f(x)

$$F'(x) = f(x)$$

$$\frac{d}{dx} \int f(x)\, dx$$

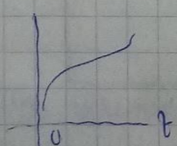
Ejemplo

Hallar la derivada de $F(x) = \int_1^{x} \frac{1}{1+t^2}\, dt$

$$F'(x) = \frac{1}{1+(x^2)^2}\, 2x$$

$$F'(x) = \frac{2x}{1+x^4}$$

① $t = x^2$



$$F'(x) = \frac{1}{1+x^4}\, 2x$$

$$F(x) = \int_1^{u} \frac{2}{sen(y)}\, dy$$

① $y = x$ $\quad \int \frac{2}{sen(y)}\, dx$

② $2dx$ $\quad F'(x)\ \frac{2}{2\,sen(x)}$

Integración por sustitución

① $z = e^x$

$e^{3x} = z^3$

② dos recta x

$\ln|e^x| = \ln(z) \quad dx = \frac{1}{z} dz$

③ $\int \frac{z^3}{1+z^3} \cdot \frac{1}{z} dz$

TAREA.

1) $\int_0^{x^3} \frac{1}{sen(t) + cos(t)}$

$\frac{\sqrt{2}}{2} \ln \frac{\tan\left(\frac{x^2}{2}\right) - 1}{\frac{2}{\sqrt{2}}} + 1 - \frac{\sqrt{2}}{2} \ln$

$\left(\frac{\tan\left(\frac{x^3}{2}\right) - 1}{\frac{2}{\sqrt{2}}} - 1 \right) \left(- \frac{\sqrt{2}}{2} \ln \left(\frac{\tan\left(\frac{a}{2}\right)}{\frac{2}{\sqrt{2}}} + 1 \right) + \frac{\sqrt{2}}{2} \ln \right.$

$\left(\frac{\tan\left(\frac{a}{2}\right) - 1}{\frac{2}{\sqrt{2}}} - 1 \right) //$

2) $\int_a^{x^2} (2t + 1)\, dt$

$\int_a^{x^2} 2t\,dt + \int_a^{x^2} 1\,dt$

$2\left(\frac{1}{2} t^2\right)_a^{x^2} \quad 2\left(\frac{1}{2}(x^2)^2 - 1, \frac{1}{2} a^2\right)$

$2\left(\frac{1}{2} x^4\right) - \frac{1}{2} a^2\right)$

$-a^2 + x^4 - a + x^2$

$\int \sqrt{1+x^2}\, dx$

$x = \tan(\theta)$

$f(x) = \tan(x)$

$f'(x) = \sec^2(x) \cdot Dx(x)$

$\sec(\theta)^2 \frac{d}{d\theta}(\theta)$

$\sec(\theta)^2$

$dx = \sec(\theta)^2\, d\theta$

$\frac{1}{2} x \sqrt{1+x^2} + \frac{1}{2} \ln \sqrt{1+x^2} + C$ //

$\int \frac{x}{\sqrt{1+x}}\, dx$

$U = 1+x$

$du = \frac{d}{dx}(1+x)$

$\frac{d}{dx}(1+x)$

$\frac{d}{dx}(1) + \frac{d}{dx}(x)$

$\frac{2}{3}\sqrt{(1+x)^3} - 2\sqrt{1+x} + C$