UNIVERSIDAD CENTRAL DEL ECUADOR
FACULTAD FILOSOFÍA, LETRAS Y CIENCIAS DE LA EDUCACIÓN
CARRERA PEDAGOGÍA DE LAS CIENCIAS EXPERIMENTALES INFORMÁTICA

TRABAJOS INDIVIDUALES

SANDY PUJOTA

Enero 2026

Sandy Pujota 4"B"

Cálculo Diferencial (Derivadas)

Función $f(x)$	Derivada $f'(x)$
C (constante)	0
x^n	nx^{n-1}
e^x	e^x
a^x	$a^x \ln(a)$
$\ln(x)$	$\frac{1}{x}$
$\log_a(x)$	$\frac{1}{x\ln(a)}$
$\sin(x)$	$\cos(x)$
$\tan(x)$	$\sec^2(x)$
$\cot(x)$	$-\csc^2(x)$
$\sec(x)$	$\sec(x)\tan(x)$
$\csc(x)$	$-\csc(x)\cot(x)$

- Suma / Resta:

$$(f \pm g)' = f' \pm g'$$

- Producto

$$(f \cdot g)' = f'g + fg'$$

- Cociente

$$\left(\frac{f}{g}\right)' = \frac{f'g - fg'}{g^2}$$

- Cadena $(f(g(x)))' = f'(g(x)) \cdot (g'(x))$

$$\frac{d}{dx}\left(\int_0^x f(t)\,dt\right) = f(x)$$

$$\int_a^b f(x)\,dx = F(b) - F(a)$$

Constante $= \int k f(x)\,dx = k\int f(x)\,dx$

Suma / Resta $= \int (f \pm g)\,dx = \int f\,dx \pm \int g\,dx$

Cálculo Integral

Función $f(x)$	Integral $\int f(x)\,dx$
x^n $(n \neq 1)$	$\frac{x^{n+1}}{n+1} + C$
$\frac{1}{x}$	(ln)
e^x	$e^x + C$
a^x	$\frac{a^x}{\ln(a)} + C$
$\sin(x)$	$-\cos(x) + C$
$\cos(x)$	$\sin(x) + C$
$\tan(x)$	(- ln
$\cot(x)$	(ln
$\sec(x)$	(ln
$\csc(x)$	(- ln

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CARRERA PEDAGOGIA DE LAS CIENCIAS EXPERIMENTALES INFORMÁTICA

Nombre: Sandy Pujota

Fecha: 18/11/2025

Curso: 4"B"

Asignatura: Matemática IV

Ecuaciones Diferenciales de variables Separables.

1. Resolver la siguiente ecuación diferencial

$$\frac{dy}{dx} = x\,y$$

① Separar variables

$$\frac{dy}{dx} = xy$$

$$\frac{dy}{y} = x\,dx$$

② Integrar ambos lados

$$\int \frac{1}{y}\,dy = \int x\,dx = \ln|y| = \frac{x^2}{2} + C$$

③ Despejar y

$$e^{\ln|y|} = e^{\left(\frac{x^2}{2} + C\right)} \qquad \text{usando: } e^{a+b} = e^a \cdot e^b$$

$$y = e^{\frac{x^2}{2}} \cdot e^C$$

$$y = Ce^{\frac{x^2}{2}} = \boxed{y = Ce^{\frac{x^2}{2}}}$$

2. $\frac{dy}{dx} = \frac{3x^2 + 4x}{2y - 1}$ $\quad y(1) = 3$

① Separar variables $(2y-1)\,dy = (3x^2 + 4x)\,dx$

② Integrar $\int (2y-1)\,dy = \int (3x^2 + 4x)\,dx$

$$\frac{\cancel{2}y^2}{\cancel{2}} - y = \frac{\cancel{3}x^3}{\cancel{3}} + \frac{\cancel{4}x^2}{\cancel{2}} + C \Rightarrow y^2 - y = x^3 + 2x^2 + C$$

② Aplico Condición Inicial $y^2 - y = x^3 + 2x^2 + C$

$$(3)^2 - (3) = (1)^3 + 2(1)^2 + C$$

$$9 - 3 = 1 + 2(1) + C$$

$$6 = 3 + C$$

$$C = 6 - 3 \Rightarrow C = 3$$

$$\boxed{y^2 - y = x^3 + 2x^2 + 3}$$

③ Ejercicio con $\dfrac{dy}{dx} = \dfrac{x^2}{y^3}$

① Separar $y^3\,dy = x^2\,dx$

$$\int u^n\,du = \frac{u^{n+1}}{n+1}$$

② Integrar $\int y^3\,dy = \int x^2\,dx$

$$\frac{y^4}{4} = \frac{x^3}{3} + C$$

$$12\left(\frac{y^4}{4}\right) = 12\left(\frac{x^3}{3}\right) + K$$

$$3y^4 = 4x^3 + K$$

$$y^4 = \frac{4x^3 + K}{3}$$

$$y = \pm\sqrt[4]{\frac{4x^3 + K}{3}}$$

④ $\dfrac{dy}{dx} = \dfrac{x}{y\ln(y^2)}$

$$y \cdot \ln(y^2)\,dy = x\,dx$$

$$\int u\,dv = uv - \int v\,du$$

$$2y\ln(y)\,dy = x\,dx$$

$\ln(y) \Rightarrow du = \dfrac{1}{y}\,dy$

$$\int 2y\ln(y)\,dy = \int x\,dx$$

$dv \Rightarrow 2y\,dy = v = y^2$

$$\int 2y\ln(y)\,dy = y^2\ln(y) - \int y^2\left(\frac{1}{y}\right)dy$$

$$= y^2\ln(y) - \int y\,dy$$

$$= y^2\ln(y) - \frac{y^2}{}$$

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5. Resolver la siguiente Ecuación Diferencial

$$\frac{dy}{dx} = 4xy^2 - 4x$$

$$\frac{dy}{dx} = 4x(y^2-1) \Rightarrow \frac{dy}{y^2-1} = 4x\,dx$$

$$\int \frac{dy}{y^2-1} = \int 4x\,dx$$

$$\frac{1}{2(1)} \ln\left|\frac{y-1}{y+1}\right| = \frac{4x^2}{2} + C$$

$$\frac{1}{2} \ln\left|\frac{y-1}{y+1}\right| = 2x^2 + C$$

$x(2)$ $$\ln\left|\frac{y-1}{y+1}\right| = 4x^2 + 2C$$

$$\left|\frac{y-1}{y+1}\right| = e^{4x^2} \cdot e^{2C}$$

$$\frac{y-1}{y+1} = Ae^{4x^2} \Rightarrow \boxed{\frac{y-1}{y+1} = Ae^{4x^2}}$$

6. $$\frac{dy}{dx} = 4x^3(y^2+1) \qquad y=(0)=1$$

$$\frac{dy}{y^2+1} = 4x^3\,dx \qquad \frac{1}{y^2+1} \Rightarrow \text{arct}(y)$$

$$\int \frac{dy}{y^2+1} = \int 4x^3\,dx$$

$$\arctan(y) = \frac{4x^4}{4} + C$$

$$\arctan(y) = x^4 + C \qquad \left(\frac{\pi}{4} = 1\right)$$

$$\arctan(1) = (0)^4 + C$$

$$C = \text{arctn}(1) \Rightarrow C = \frac{\pi}{4}$$

$$\text{arctn}(y) = x^4 + \frac{\pi}{4}$$

$$y = \tan\left(x^4 + \frac{\pi}{4}\right)$$

7) $\frac{dy}{dx} = x + xy^2$

$$\frac{dy}{dx} = x(1+y^2) \Rightarrow \frac{dy}{1+y^2} = x\,dx$$

$$\int \frac{dy}{1+y^2} = \int x\,dx$$

$$\arctan(y) = \frac{x^2}{2} + C$$

$$y = \tan\left(\frac{x^2}{2} + C\right)$$

8- Resolver $\frac{dy}{dx} = \frac{\sec^2(y)}{\csc(x)}$

- $\sec^2(y) = \frac{1}{\cos^2(y)}$
- $\csc(x) = \frac{1}{\sin(x)}$

$$\frac{dy}{dy} = \frac{\frac{1}{\cos^2(y)}}{\frac{1}{\sin(x)}} = \frac{\sin(x)}{\cos^2(x)}$$

$$\cos^2(y)\,dy = \sin(x)\,dx$$

$$\int \cos^2(y)\,dy = \int \sin(x)\,dx$$

$$\int \frac{1+\cos(2y)}{2}\,dy = \frac{1}{2}\int (1+\cos(2y))\,dy$$

$$= \frac{1}{2}\left(y + \frac{1}{2}\sin(2y)\right) = \frac{y}{2} + \frac{1}{4}\sin(2y)$$

$$\int \sin(x)\,dx = -\cos(x)$$

$$\frac{y}{2} + \frac{1}{4}\sin(2y) = -\cos(x) + C \text{ //}$$

9. Resolver $\frac{dy}{dx} = \frac{4x^3}{y}$ $\quad y(1) = -2$

$$y\,dy = 4x^3\,dx$$

$$\int y\,dy = \int 4x^3\,dx$$

$$\frac{y^2}{2} = 4\left(\frac{x^4}{4}\right) + C$$

$$\frac{y^2}{2} = x^4 + C \Rightarrow$$

$$\frac{(-2)^2}{2} = (1)^4 + C$$

$$\frac{4}{2} = 1 + C$$

$$2 = 1 + C$$

$$c = 2 - 1 \Rightarrow \boxed{C = 1}$$

$$\frac{y^2}{2} = x^4 + 1$$

$$y^2 = 2(x^4 + 1)$$

$$y = \sqrt{2x^4 + 2}$$

10. Resolver la Ecuación $\frac{dy}{dx} = \frac{x^2+1}{y^2+1}$ $y(0) = 1$

$$(y^2+1)\,dy = (x^2+1)\,dx$$

$$\int (y^2+1)\,dy = \int (x^2+1)\,dx$$

$$\int \frac{y^{2+1}}{2+1}\,dy = \int \frac{x^{2+1}}{2+1}\,dx$$

$$\frac{y^3}{3} + y = \frac{x^3}{3} + x + C$$

$$\frac{(1)^3}{3} + 1 = \frac{(0)^3}{3} + 0 + C$$

$$\frac{1}{3} + 1 = C$$

$$c = \frac{1}{3} + \frac{1}{3} \Rightarrow \frac{1+3}{3} \Rightarrow \boxed{c = \frac{4}{3}}$$

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Nombre: Sandy Pujota

Curso: 4 "B"

Asignatura: Matemática IV

Tema: Ecuaciones Diferenciales homogéneas.

Indicaciones: Realizar 5 ejercicios por cada tema de la Unidad.

- $\dfrac{dy}{dx} = \dfrac{x^2 + y^2}{xy}$

$x^2 + y^2 \to (tx)^2 + (ty)^2 = t^2(x^2 + y^2)$

$xy \to (tx)(ty) = t^2 xy$

$$\frac{x^2+y^2}{xy} = \frac{x^2}{xy} + \frac{y^2}{xy} = \frac{x}{y} + \frac{y}{x} = \frac{1}{u} + u \qquad \boxed{u = \frac{y}{x}}$$

C. $y = ux \Rightarrow \dfrac{dy}{dx} = u + x\dfrac{du}{dx}$

$$u + x\frac{du}{dx} = \frac{x^2 + (ux)^2}{x(ux)} = \frac{x^2(1+u^2)}{x^2 u} = \frac{1+u^2}{u}$$

$$u + \frac{x\,du}{dx} = \frac{1+u^2}{u} = \frac{1}{u} + u$$

$$u\,du = \frac{1}{x}\,dx$$

$$\int u\,du = \int \frac{1}{x}\,dx$$

$$\frac{u^2}{2} = \ln|x| + C$$

$$u^2 = 2\ln|x| + C$$

$$\left(\frac{y}{x}\right)^2 = 2\ln|x| + C \Rightarrow \frac{y^2}{x^2} = 2\ln|x| + C$$

$$\boxed{y^2 = x^2(2\ln|x| + C)}$$

$$\frac{dy}{dx} = \frac{y^2 - x^2}{2xy}$$

$$\frac{y^2 - x^2}{2xy} = \frac{\left(\frac{y}{x}\right)^2 - 1}{2\left(\frac{y}{x}\right)} = \frac{u^2-1}{2u} \qquad \boxed{u = \frac{y}{x} \; ; \; y = ux}$$

$$\frac{dy}{dx} = u + x\frac{du}{dx}$$

$$u + x\frac{du}{dx} = \frac{u^2-1}{2u}$$

$$x\frac{du}{dx} = \frac{u^2-1}{2u} - u = \frac{u^2-1-2u^2}{2u} = \frac{-u^2-1}{2u} = -\frac{u^2+1}{2u}$$

$$\frac{2u}{u^2+1}\,du = -\frac{1}{x}\,dx$$

$$\int \frac{2}{u^2+1}\,du = -\int \frac{1}{x}\,dx \qquad u = u^2+1 \;|\; du = 2u\,du$$

$$\int \frac{du}{u} = \ln|u| = \ln(u^2+1)$$

$$\ln(u^2+1) = -\ln|x| + c$$

$$\ln(u^2+1) + \ln|x| = c \Rightarrow \ln(|x|(u^2+1)) = c$$

$$|x|(u^2+1) = C \; ; \; C = e^c > 0$$

$$x(u^2+1) = C$$

sustituimos

$$x\left(\frac{y^2}{x^2} + 1\right) = C \Rightarrow \frac{y^2}{x} + x = C$$

$$\boxed{x^2 + y^2 = Cx}$$

$$\frac{dy}{dx} = \frac{x^3 + y^3}{xy^2}$$

$$\frac{1 + \left(\frac{y}{x}\right)^3}{\left(\frac{y}{x}\right)^2} = \frac{1+u^3}{u^2} \; ; \quad u = \frac{y}{x}$$

$$\frac{dy}{dx} = u + x\frac{du}{dx} = \frac{1+u^3}{u^2}$$

$$x\frac{du}{dx} = \frac{1+u^3}{u^2} - u = \frac{1+u^3-u^3}{u^2} = \frac{1}{u^2}$$

$$u^2\,du = \frac{1}{x}\,dx$$

$$\int u^2\,du = \int \frac{1}{x}\,dx \Rightarrow \frac{u^3}{3} = \ln|x| + C$$

$$\frac{1}{3}\left(\frac{y}{x}\right)^3 = \ln|x| + C \Rightarrow \frac{y^3}{3x^3} = \ln|x| + C$$

$$\boxed{y^3 = 3x^3(\ln|x| + C}$$

$$y = x\sqrt{3(\ln|x|} + C$$

- $$\frac{dy}{dx} = \frac{3x + 2y}{x}$$

$$y = ux \Rightarrow \frac{dy}{dy} = u + x\frac{du}{dx}$$

$$\frac{dy}{dx} = 3 + 2\frac{y}{x} = f\left(\frac{y}{x}\right)$$

$$u + x\frac{du}{x} = 3 + 2u$$

$$u + x\frac{du}{x} = 3 + 2u$$

$$x\frac{du}{dx} = 3 +$$

$$x\frac{du}{x} = 3 + u$$

$$\frac{du}{3+u} = \frac{dx}{x}$$

$$\ln|u+3| = \ln|x| + C$$

$$u + 3 = Cx \Rightarrow \frac{y}{x} + 3 = Cx \Rightarrow y = Cx^2 - 3x$$

$$\boxed{y = Cx^2 - 3x}$$

- $$y\,dx - 2(x+y)\,dy = 0$$

$$x = vy \Rightarrow dx = v\,dy + y\,dv$$

$$y(v\,dy + y\,dv) - 2(vy + y)\,dy = 0$$

$$y\,dv - (v+2)\,dy = 0$$

$$\frac{dv}{(v+2)} - \frac{dy}{y} = 0$$

$$\ln|v+2| - \ln|y| = C$$

$$\ln\left|\frac{x}{y} + 2\right| - \ln|y| = C$$

$$C = x + 2y = Cy^2$$

Ecuaciones Diferenciales Exactas

- $x\,dy + y\,dx$

$d(x,y) = d(c)$

$\int d(xy) = \int dc$

$xy = C$

- $(y+2)\,dx + (x+y^2)\,dy = 0 \qquad M\,dx + N\,dy = 0$

$f(x,y)$

$\int (y+2)\,dx = \int y\,dx + \int 2\,dx = y\int dx + 2\int dx$

$= yx + 2x + g(y)$

$f(x,y) = xy + 2x + g(y)$

$f_y = \cancel{x} + g'(y) = \cancel{x} + y^2$

$g'(y) = y^2$

$g(y) = \int y^2\,dy = \frac{y^3}{3}$

$f(x,y) = xy + 2x + \frac{y^3}{3}$

Expresar la solución general

$f(x,y) = xy + 2x + \frac{y^3}{3}$

$xy + 2x + \frac{y^3}{3} = C$

- $(4x+y)\,dx + (x+2y)\,dy = 0$

$M = 4x + y \quad ; \quad N = x + 2y$

$M_y = 1 \quad ; \quad N_x = 1$

$\int (4x+y)\,dx = 2x^2 + xy + h(y)$

$F_y = x + h'(y) = x + 2y$

$h'(y) = 2y \Rightarrow h(y) = y^2$

$\boxed{2x^2 + xy + y^2 = C}$

$(3x^2+2y)\,dx + (2x+4y^3)\,dy = 0$

$M = 3x^2+2y \quad ; \quad N = 2x+4y^3$

$M_y = 2 \qquad N_x = 2$

$\int (3x^2+2y)\,dx = x^3 + 2xy + h(y)$

$F_y = 2x + h'(y) = 2x + 4y^3$

$h'(y) = 4y^3 \Rightarrow h(y) = y^4$

$\boxed{x^3 + 2xy + y^4 = C}$

$(6x+3y)\,dx + (3x+4y)\,dy = 0$

$M = 6x+3y \quad ; \quad N = 3x+4y$

$M_y = 3 \quad , \quad N_x = 3$ son exactas

$\int (6x+3y)\,dx = 3x^2 + 3xy + h(y)$

$F_y = 3x + h'(y) = 3x + 4y$

$h'(y) = 4y \Rightarrow h(y) = 2y^2$

$\boxed{3x^2 + 3xy + 2y^2 = C}$

Ecuaciones Diferenciales Lineales

$x^3 \frac{dy}{dx} + 3x^2 y = x$

$\frac{dy}{dx} + p(x)y = q(x)$ → esta es forma lineal

$\frac{dy}{dx} + \frac{3\cancel{x^2}}{\cancel{x^3}} y = \frac{x}{x^3}$

$p(x) = \frac{3}{x}$; $q(x) = \frac{1}{x^2}$

$\frac{dy}{dx} + \frac{3}{x} y = \frac{1}{x^2}$

$u(x) = e^{\int p(x)dx} = e^{\int \frac{3}{x} dx} = e^{3\int \frac{dx}{x}}$

$= e^{3\ln x}$

$= e^{\ln x^3} = x^3$

$\cancel{x^3} y = \int \cancel{x^3} \frac{1}{\cancel{x^2}} dx$

$uy = \int uq\, dx$

$x^3 y = \int x\, dx$

$x^3 y = \frac{x^2}{2} + C$

$y = \frac{\cancel{x^2}}{2\cancel{x^3}} + \frac{C}{x^3}$

$\boxed{y = \frac{1}{2x} + \frac{C}{x^3}}$

$\frac{dy}{dx} + p(x)y = q(x)$ $\frac{dy}{dx} + 2y = x$

$\frac{dy}{dx} + 2y = x$

$p(x) = 2$; $q(x) = x$

$u = e^{\int 2dx} = e^{2x}$

$\boxed{yu = \int qu\, dx}$

$y e^{2x} = \int x e^{2x} dx$

$\boxed{\int u\, dv = uv - \int v\, du}$

$y e^{2x} = x \frac{1}{2} e^{2x} - \int \frac{1}{2} e^{2x} dx$

$u = x$ $dv = e^{2x} dx$

$du = dx$ $v = \frac{1}{2} e^{2x}$

$y e^{2x} = \frac{1}{2} x e^{2x} - \frac{1}{4} e^{2x} C$

$y = \frac{\frac{1}{2} x \cancel{e^{2x}}}{\cancel{e^{2x}}} - \frac{\frac{1}{4} \cancel{e^{2x}}}{\cancel{e^{2x}}} + \frac{C}{e^{2x}}$

$\boxed{y = \frac{1}{2}x + \frac{1}{4} + Ce^{-2x}}$

$y' + 3y = 6$

$P(x) = 3 \quad ; \quad q(x) = 6$

$u(x) = e^{\int P(x)dx} = e^{3x}$

$e^{3x} y' + 3e^{3x} y = 6e^{3x}$

$\frac{d}{dx}(ye^{3x})$

$\int \frac{d}{dx}(ye^{3x})\,dx = \int 6e^{3x}\,dx$

$ye^{3x} = 2e^{3x} + C$

$y = 2 + Ce^{-3x}$

$\boxed{y = 2 + Ce^{-3x}}$

- $y' + \tan x\, y = \sin x$

$P(x) = \tan x \quad ; \quad q(x) = \sin x$

$u(x) = e^{\int \tan x\,dx} = e^{-\ln|\cos x|} = \sec x$

$\sec x\, y' + y \sec \tan x = \sin x \sec x$

- $\frac{d}{dx}(y \sec x)$
- $\sin x \sec x = \tan x$

$y \sec x = \int \tan x\,dx = -\ln|\cos x| + C$

$y = \cos x(-\ln|\cos x| + C)$

$\boxed{y = \cos x\,(C - \ln|\cos x|)}$

- $y' + 4y = e^{-3x}$

$P(x) = 4 \qquad q(x) = e^{-3x}$

$u(x) = e^{\int 4\,dx} = e^{4x}$

$e^{4x} y' + 4e^{4x} y = e^{x}$

$\frac{d}{dx}(ye^{4x}) = e^{x}$

$ye^{4x} = \int e^{x}\,dx = e^{x} + C$

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Fecha: 15/01/26

$$\boxed{\int^{2} x \ln|x| \, dx}$$

$$\int_a^b f(x)\,dx \approx \sum_{i=0}^{n} w_i f(x_i) \qquad \text{con } x_i = a + h \qquad \int_0^b f(x)\,dx = \frac{b-a}{6}\left[f(a) + 4f(m)\right.$$

Datos

$a = 1$; $b = 2$; $m = 1,5$

$$m = \frac{1+2}{2} = \frac{3}{2} = 1,5$$

$$f(1) = 1 \cdot \tan(1) = \tan(1)$$

$$\int_1^2 x \tan(x)\,dx = \frac{2-1}{6}\left[1,15 + 4 + 4(21,15) - 4,37\right]$$

$$= \frac{1}{6}(1,55) + 84,60 - 4,37$$

$$= \frac{1}{6}(81,79) = \boxed{13,63}$$

$$\int_{-1}^{1} (3x^2 + 2x + 1)\, dx$$

$f(x) = 3x^2 + 2x + 1$

$3\int x^2 dx + 2\int x\, dx + \int dx$

$3\, \frac{x^3}{}$

$x_1 = \frac{1}{\sqrt{3}} \qquad x^2 = \frac{1}{\sqrt{3}}$

$f\left(-\frac{1}{\sqrt{3}}\right) = 3\left(\frac{1}{3}\right) - \frac{2}{\sqrt{3}} + 1 = 1 - \frac{2}{\sqrt{3}} + 1 = 2 - \frac{2}{\sqrt{3}}$

$f\left(-\frac{1}{\sqrt{3}}\right) = 3\left(\frac{1}{3}\right) - \frac{2}{\sqrt{3}} + 1 + 2 + \frac{2}{3}$

$\left(2 - \frac{2}{\sqrt{3}}\right)\left(2 + \frac{2}{\sqrt{3}}\right)$

$f = 0 + 4 = 4$

UNIVERSIDAD CENTRAL DEL ECUADOR

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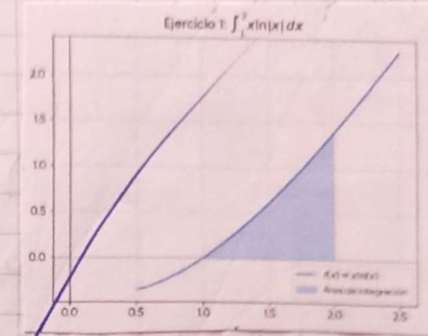
Fecha: 16/01/26

Curso: 4to "B"

Resolver los siguientes ejercicios / Newton Cotes / Cuadratura de Gauss

$$\int_1^2 x \ln|x|\, dx$$



$$f(x)\, dx \approx h \cdot \sum_{i=0}^{n} w_i \cdot f(x_i)$$

$$f(x)\, dx = \frac{h}{3}\left[f(x_0) + 4f(x_1) + f(x_2)\right]$$

Datos

- $h = \frac{b-a}{2}$; $x_0 = a$; $x_1 = a+h$; $x_2 = b$
- $a = 1$; $b = 2$; $n = 2$

$h = \frac{b-a}{n} = \frac{1}{2} = 0,5$

Nodos

$x_0 = 1$; $x_1 = 1,5$; $x_2 = 2$

Coeficiente NC

$w_0 = \frac{1}{6}$; $w_1 = \frac{4}{6}$; $w_2 = \frac{1}{6}$

$f(x) = x\ln(x)$

Evaluamos

- $f(1) = 1 \cdot \ln(1) = 0$
- $f(1,5) = 1.5 \cdot \ln(1,5) \approx 1,5 \cdot (0,4055) = 0,6083$
- $f(2) = 2 \cdot \ln(2) \approx 2(0,6931) = 1,3862$

$$\int_1^2 x\ln(x)\, dx \approx \frac{1}{6} \cdot f(1) + \frac{4}{6} \cdot f(1,5) + \frac{1}{6} \cdot f(2)$$

$$= \frac{1}{6} \cdot 0 + \frac{4}{6} \cdot 0,6083 + \frac{1}{6} \cdot 1,3862$$

$$\approx 0 + 0,4055 + 0,2310 = 0,6365$$

$$\int_1^2 x\ln(x)\, dx = \boxed{0,6365}$$

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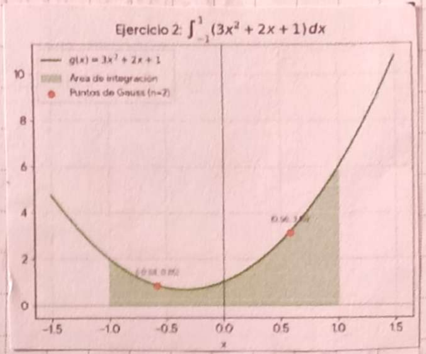
$$\int_{-1}^{1} (3x^2 + 2x + 1)\, dx$$



Datos.N

$-\frac{1}{\sqrt{3}} \approx -0,5774$

- $\frac{1}{\sqrt{3}} \approx 0,5774$

$f(x) = 3x^2 + 2x + 1$

- $x_1 = -0,5774$; $f(-0,5774) = 3(-0,5774)^2 + 2(-0,5775) + 1$

$= 3(0,3334) - 1,1548 + 1 = 1,0002 - 1,1548 + 1 = 0,8454$

- $x_2 = 0,5774$; $f(0,5774) = 3(0,5774)^2 + 2(0,5774) + 1$

$= 3(0,3334) + 1,1548 + 1 = 1,0002 + 1,1548 + 1 = 3,155$

Remplazamos

$$\int_{-1}^{1} f(x)\, dx = 1(0,8454 + 1\cdot(3,155) = 0,8454 + 3,155 = \boxed{4,0004} \approx 4,1$$

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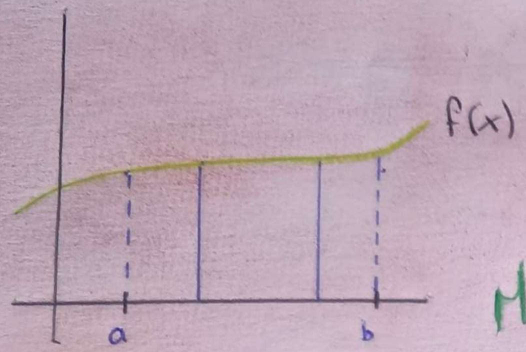
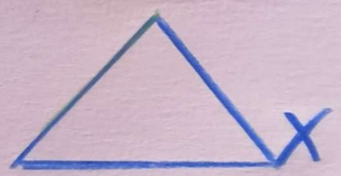
INFORMÁTICA

TRABAJOS GRUPALES

SANDY PUJOTA



Dividir, aproximar y sumar áreas



REGLA DEL TRAPECIO

Método Numérico utilizado

Aproximada

Valor Integral Definida

Fórmulas Importantes

$$\Delta x = \frac{b-a}{n}$$

Regla del Trapecio

$$\int_a^b f(x)\,dx \approx \frac{b-a}{2}\left[f(a)+f(b)\right]$$

Regla del Trapecio compuesto

$$\int_a^b f(x)\,dx \approx \frac{\Delta x}{2}\left[f(x_0)+2f(x_1)+2f(x_2)\ldots f\right.$$

Elementos

a: límite inferior

b: límite superior

n: número de subintervalos

f(x): Función

Δx: ancho de cada trapecio

Método, estimar integrales definidos.

- katty Iza
- Londóñori stiven.
- Pujota Sandy

Universidad Central del Ecuador
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Pedagogía en las Ciencias Experimentales Informática

Nombre: David Palacios, Emily López, Sandy Pujota.

Curso: 4to 'B'

Fecha: 23-10-2025

Taller N° 1

1. Calcula la derivada de $f(x) = 2x^3 + 4x^2 - 5x + 1$

$f(x) = 2x^3 + 4x^2 - 5x + 1$

$f'(x) = \frac{d}{dx}(2x^3) + \frac{d}{dx}(4x^2) - \frac{d}{dx}(5x) + \cancel{\frac{d}{dx}}$

$f'(x) = 2\frac{d}{dx}(x^3) + 4\frac{d}{dx}(x^2) - 5\frac{d}{dx}(x)$

$f'(x) = 2(3)x^2 + 4(2)x - 5(1)$

$f'(x) = 6x^2 + 8x - 5$

2. Bajo la condición de la función $(1, 2)$ hallar la función original.

$f'(x) = 6x^2 + 8x - 5$

$= \int (6x^2 + 8x - 5)dx$

$= \int 6x^2 dx + \int 8x dx - \int 5 dx$

$= 6\int x^2 dx + 8\int x dx - 5\int dx$

$= 6\left(\frac{x^{2+1}}{2+1}\right) + 8\left(\frac{x^{1+1}}{1+1}\right) - 5x$

$= 6\left(\frac{x^3}{3}\right) + 8\left(\frac{x^2}{2}\right) - 5x$

$= 2x^3 + 4x^2 - 5x + C$

$f(1) = 2$

$2 = 2(1)^3 + 4(1)^2 - 5 + C$

$2 = 2 + 4 - 5 + C$

$2 = 1 + C$

$1 = C$

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3. Hallar la derivada de $f(x) = \frac{1}{4}x^4 - \frac{2}{3}x^3 + 5x^2 - 8x + 3$

$f(x) = \frac{1}{4}x^4 - \frac{2}{3}x^3 + 5x^2 - 8x + 3$

$f'(x) = \frac{d}{dx}\left(\frac{1}{4}x^4\right) - \frac{d}{dx}\left(\frac{2}{3}x^3\right) + \frac{d}{dx}\left(5x^2\right) - \frac{d}{dx}(8x) + \frac{d}{dx}(3)$

$f'(x) = \frac{1}{4} \cdot \frac{d}{dx}(x^4) - \frac{2}{3}\frac{d}{dx}(x^3) + 5\frac{d}{dx}(x^2) - 8\frac{d}{dx}(x) + 0$

$f'(x) = \frac{1}{4}(4)(x^{4-1}) - \frac{2}{3}(x^{3-1}) + 5(2)(x^{2-1}) - 8(1) + 0$

$f'(x) = x^3 - 2x^2 + 10x - 8$

4. Una condición inicial la funcion original $f(x)$ pasar por el punto $(2, 9)$
es decir $f(3) = 9$

$\int (x^3 - 2x^2 + 10x - 8)\,dx$

$\int x^3 dx - \int 2x^2 dx + \int 10x\,dx - \int 8\,dx$

$\frac{x^{3+1}}{3+1} - 2\int x^2 dx + 10\int x\,dx - 8\int dx$

$\frac{x^4}{4} - 2\left(\frac{x^{2+1}}{2+1}\right) + 10\left(\frac{x^{1+1}}{1+1}\right) - 8x + C$

$\frac{x^4}{4} - \frac{2}{3}x^3 + 5x^2 - 8x + C$

$f(3) = 9$

$9 = \frac{(2)^4}{4} - \frac{2}{3}(2)^3 + 5(2)^2 - 8(2) + C$

$9 = 4 - \frac{16}{3} + 20 - 16 + C$

$9 = \frac{8}{3} + C$

$9 - \frac{8}{3} = C$

$\frac{19}{3} = C$

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Pedagogía en las Ciencias Experimentales Informática

Nombre: Palacios David, Sandy Pujota, López Emily Fecha: 30-10-2023
Curso: 4 to "B" Asignatura: Matemática III

Taller: Taller 2° Ecuaciones Diferencial

1.- Resolver la siguiente ecuación diferencial con valor inicial

$$\frac{dy}{dx} = \frac{4}{3}x^{-\frac{4}{5}} \qquad y(1) = 2$$

$$dy = \frac{4}{3}x^{-\frac{4}{5}}dx$$

$$\int dy = \int \frac{4}{3}x^{-\frac{4}{5}}dx$$

$$y = \frac{4}{3}\int x^{-\frac{4}{5}}dx$$

$$y = \frac{4}{3}\left(\frac{x^{-\frac{4}{5}+1}}{-4/5+1}\right)+C$$

$$y = \frac{4}{3}\left(\frac{x^{\frac{1}{5}}}{1/5}\right)+C$$

$$y = \frac{4}{3}\left(\frac{5x^{\frac{1}{5}}}{1}\right)+C$$

$$y = \frac{4}{3}5x^{\frac{1}{5}}+C$$

$$y = \frac{20}{3}x^{\frac{1}{5}}+C$$

$$2 = \frac{20}{3}\sqrt[5]{x}+C$$

$$2 = \frac{20}{3}\sqrt[5]{1}+C$$

$$2 = \frac{20}{3}(1)+C$$

$$2 = \frac{20}{3}+C$$

$$2 - \frac{20}{3} = C$$

$$-\frac{14}{3} = C$$

$$\boxed{y = \frac{4}{3}3x^{\frac{1}{5}} - \frac{14}{3}}$$

2.- La función $\frac{dy}{dx} = 3x^2y$ con valor inicial $y(1)=2$

$$\frac{dy}{dx} = 3x^2y$$

$$dy = 3x^2y\,dx$$

$$\frac{dy}{y} = 3x^2dx$$

$\int \frac{1}{y} dy = \int 3x^2 dx$

$\ln|y| = 3\int x^2 dx$

$\ln|y| = 3\left(\frac{x^{2+1}}{2+1}\right) + c$

$\ln|y| = \cancel{3}\left(\frac{x^3}{\cancel{3}}\right) + c$

$\ln|y| = x^3 + c$

$e^{x^3+c} = y$

$y = e^{x^3+c}$

$y = e^{x^3} \cdot e^c$

$2 = e^{(1)^3} \cdot e^c$

$2 = e \cdot e^c$

$\ln|2| = \ln|e| + \ln|e^c|$

$\ln|2| = 1(\ln|e^c|)$

$\ln|2| = c(\ln|e|$

$\ln|2| = c(1)$

$\ln|2| = c$

$\boxed{y = e^{x^3 + \ln|2|}}$

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18

ASIGNATURA:

Matemática IV

NOMBRES:

López Emily

Palacios David

Pujota Sandy

TUTOR:

Mgtr. Diego Tipán

CURSO:

PCEI - 4B

TAREA: (Trabajo Grupal)

Realización de ejercicios

TEMA:

Valor Inicial

FECHA DE ENTREGA:

14/11/2025

Universidad Central del Ecuador
Facultad de Filosofía, Letras y Ciencias de la Educación
Pedagogía en las Ciencias Experimentales Informática

Nombre: David Palacios ~~Fecha: 14-11-2025~~

Curso: 460 "B" Asignatura: Matemática IV

Taller 3: Ecuaciones diferenciales con valor inicial.

1. $\frac{dy}{dx} = 3y$, $y(0) = 2$

$dy = 3y\,dx$

$\frac{dy}{y} = 3dx$

$\int \frac{1}{y} dy = \int 3\,dx$

$\ln|y| = 3x + C$

$e^{\ln|y|} = e^{3x+C}$

$y \ln|e| = e^{3x+C}$

$y = e^{3x+C}$

$y = e^{3x} \cdot e^{C}$

* Sustitución

$2 = e^{3(0)} \cdot e^{C}$

$2 = e^{0} \cdot e^{C}$

$2 = e^{C}$

$\ln|2| = \ln|e^{C}|$

$\ln|2| = C \cancel{\ln|e|}$

$\ln|2| = C(1)$

$\ln|2| = C$

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$\ln|2|$

2. $\frac{dy}{dx} = x+g \qquad y(0) = 1$

$\frac{dy}{dx} - y = x\,dx$

* Aplicación de la Fórmula Factor Integrante

$\mu(x) = e^{\int P(x)\,dx}$

$\mu(x) = e^{\int -1 dx}$

$\mu(x) = e^{-x}$

$e^{-x}\left(\frac{dy}{dx} - y\right) = e^{-x}(x)e^{-x}$

$\frac{dy}{dx} - e^{-x}y = xe^{-x}$

$\frac{d}{dx}(y \cdot e^{-x}) = xe^{-x}$

$\int \frac{d}{dx}(ye^{-x})\,dx = \int xe^{-x}\,dx \; ye^{-x} = \int xe^{-x}\,dx$

$ye^{-x} = -xe^{-x} - e^{-x} + C$

$y = e^{x}(-xe^{-x} - e^{-x} + C)\, y = -x - 1 + Ce^{x}$

$1 = -(0) - 1 + Ce^{(0)}\, 1 = 0 - 1 + C \cdot 1\, 1 = -1 + C\, C = 1 + 1\, C = 2$

$y = 2e^{x} - x - 1$

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CARRERA DE PEDAGOGIA DE LAS CIENCIAS EXPERIMENTALES INFORMÁTICA

Nombre: Sandy Pujota

Fecha: 14/11/2025

Curso: 4" B"

Matemática II

Taller #3

Resolver el siguiente ejercicio.

$\frac{dy}{dx} = 3y \quad ; \quad y(0) = 2$

$dy = 3y\,dx$

$\frac{dy}{y} = 3dx$

$\int \frac{1}{y}\,dy = 3dx$

$\ln|y| = 3x + c$

$e\ln|y| = e^{3x+c}$

$y = e^{3x+c}$

$y = e^{3x} \cdot e^{c}$

Sustitución

$2 = e^{3(0)} \cdot e^{c}$

$2 = e^{0} \cdot e^{c}$

$2 = e^{c}$

$\ln|2| = \cancel{\ln} |e^{c}|$

$\ln|2| = c(1)$

$\ln|2| = c$

- Ecuación

$y = e^{3x + \ln|2|}$

$\frac{dy}{dx} = x + y \qquad y(0) = 1$

$\frac{dy}{dx} - y = x\,dx$

- Aplicación de la fórmula Factor Integrante

$\mu(x) = e^{\int P(x)\,dx}$

$\mu(x) = e^{\int -1\,dx}$

$\mu(x) = e^{-x}$

$e^{-x}\left(\frac{dy}{dx} - y\right) = e^{-x}(x)e^{-x}$

$\frac{dy}{dx} e^{-x} y = x e^{-x}$

$$\int \frac{d}{dx}\left(ye^{-x}\right) dx = \int xe^{-x}\, dx \quad ye^{-x} = \int xe^{-x}\, dx$$

$$ye^{-x} = xe^{-x} - e^{-x} + C$$

$$y = e^{x}(-xe^{-x} - e^{-x} + C) \quad y = x - 1 + Ce^{x}$$

$$1 = (0) - 1 + (e^{(0)}) = 0 - 1 + C - 1 = 1 + C \quad 1 + 1 + C = 2$$

$$y = 2e^{x} - x - 1$$