EJERCICIO 2

$y=cx$

$dy=c\,dx$

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

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

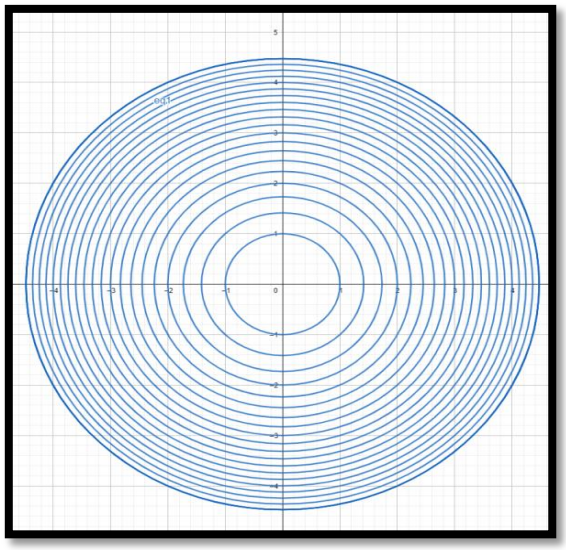
$dy * y = - dx*x$

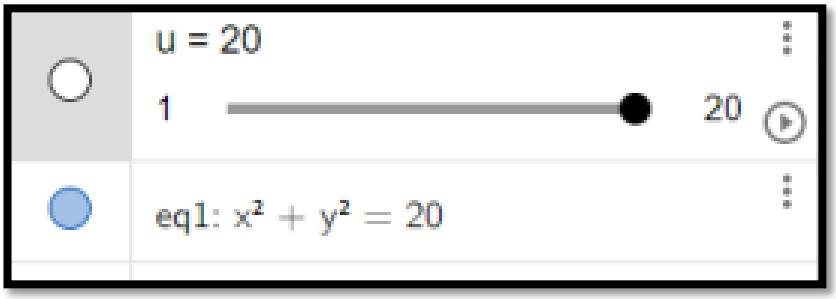
$\int y\,dy = \int -x\,dx$

$\frac{y^2}{2} = \frac{-x^2}{2} + c$

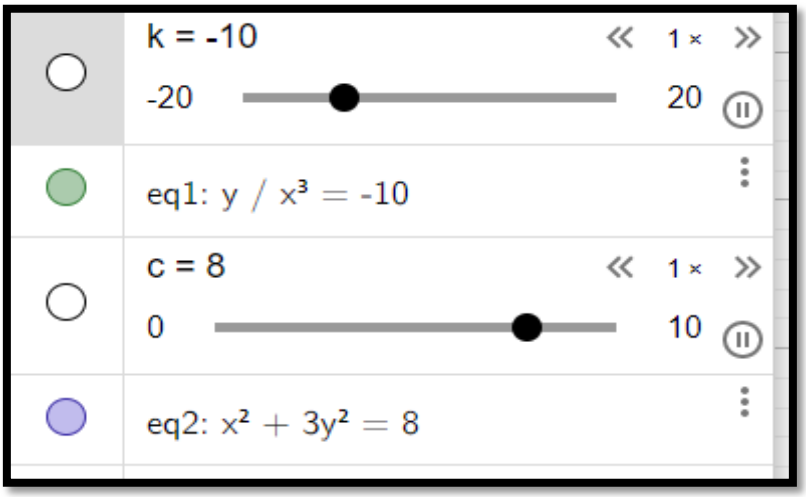
$\frac{y^2}{2} + \frac{-x^2}{2} = c$

$y^2 + x^2 = k$





EJERCICIO NO.5



A)

$X^2 + 3Y^2 = C$

$(X^2 + 3Y^2)' = C'$

$2X + 6Y = 0$

$X + 3YY' = 0$

$x - \frac{3y}{y'} = 0$

$xy' - 3y = 0$

$x\frac{dy}{dx} - 3y = 0$

$xdy - 3ydx = 0$

$\frac{1}{xy}(xdy - 3dydx) = \frac{1}{xy} * 0$

$\frac{dy}{y} - \frac{3dx}{x} = 0$

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

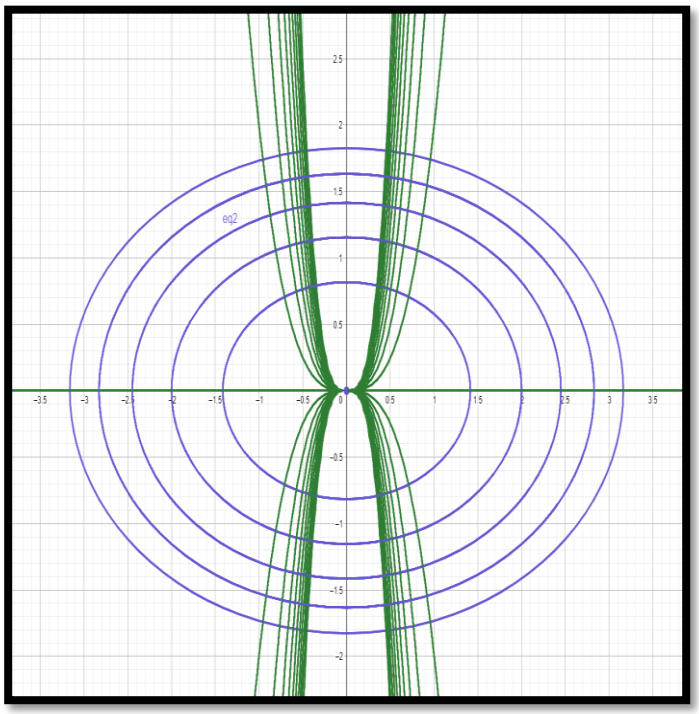
$in(y) = in(x^3) + 3$

$in\left(\frac{y}{x^3}\right) = c$

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

$\frac{y}{x^3} = k$

$y = kx^3$



B)

$$y^2 = 2cx$$

$$2yy' = 2c$$

$$y' = \frac{2c}{2y}$$

$$y' = \frac{c}{y}$$

$$y' = \frac{y}{c}$$

$$y' = \frac{y}{\frac{y^2}{2x}}$$

$$y' = \frac{2xy}{y^2}$$

$$y' = \frac{2x}{y}$$

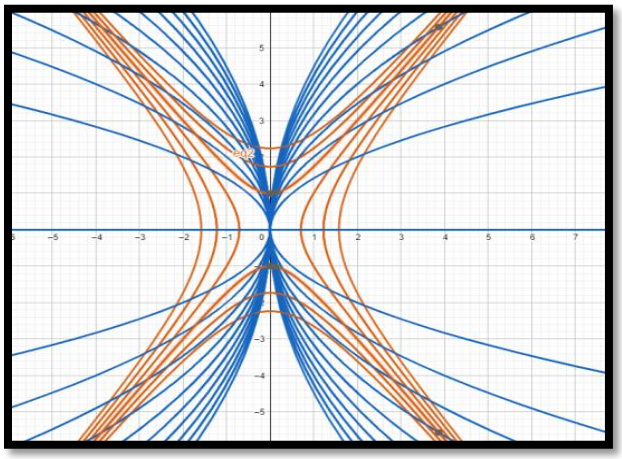
$$\frac{dy}{dx} = \frac{2x}{y}$$

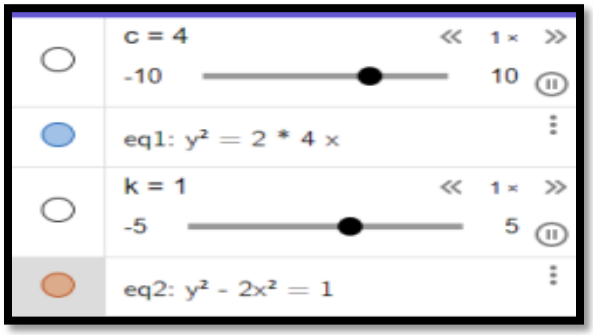
$$\int y\frac{dy}{dx} = \int 2x\frac{dy}{dx}$$

$$\frac{y^2}{2} = \frac{2x^2}{2} + c$$

$$\frac{y^2}{2} - x^2 = c$$

$$y^2 - 2x^2 = k$$





C)

$$y = cx^2$$

$$y' = 2cx$$

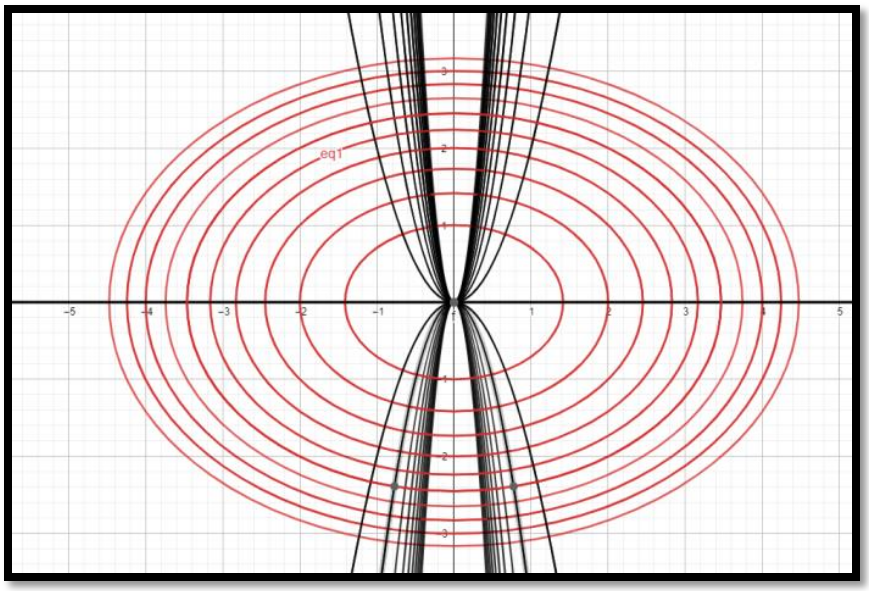
$$\frac{dy}{dx} = -\frac{1}{2cx}$$

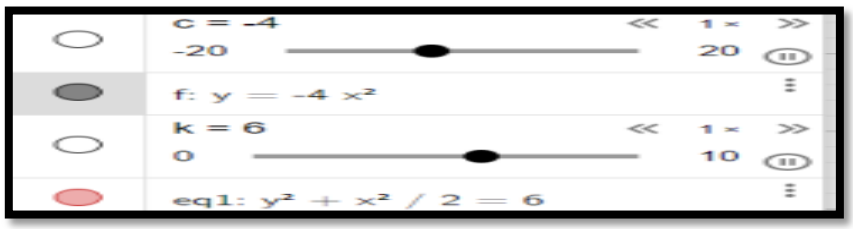
$$\frac{dy}{dx} = \frac{-x}{2y}$$

$$\int 2ydy = \int -xdx$$

$$y^2 = \frac{-x^2}{2} + c$$

$$y^2 + \frac{x^2}{2} = c$$





D)

$$xy = c$$

$$y = \frac{c}{x}$$

$$y' = -cx^{-2}$$

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

$$y' = -\frac{y}{x}$$

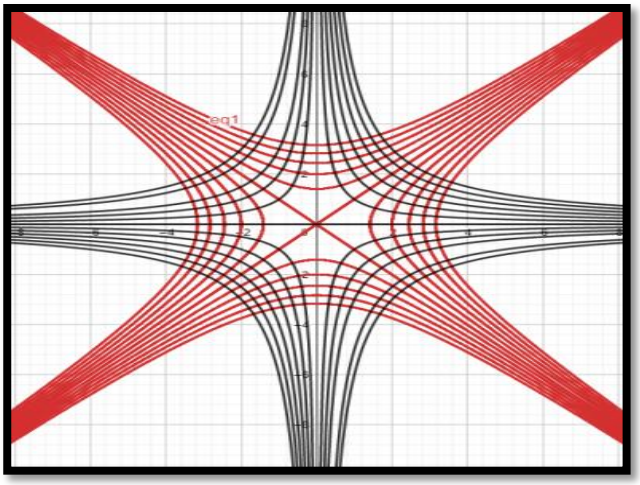
$$\frac{dy}{dx} = \frac{x}{y}$$

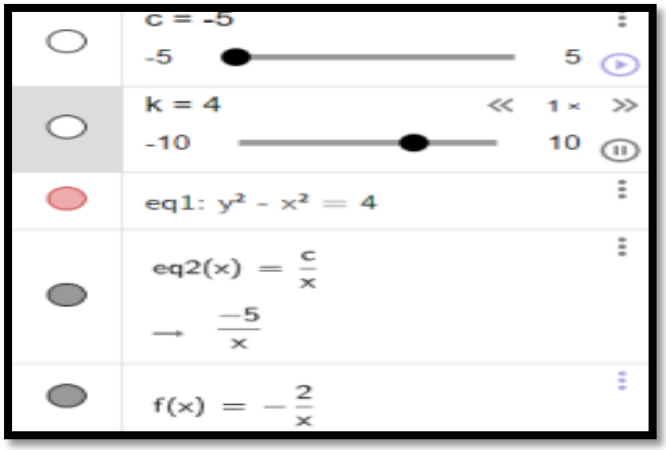
$$dyy = xdx$$

$$\frac{y^2}{2} = \frac{x^2}{2} + c$$

$$\frac{y^2}{2} - \frac{x^2}{2} = c$$

$$y^2 - x^2 = k$$





E)

$$x + 2y = c$$

$$\frac{c - x}{2} = y$$

$$y' = \frac{1}{2}$$

$$y'_2 = \frac{-1}{-\frac{1}{2}}$$

$$y'_2 = 2$$

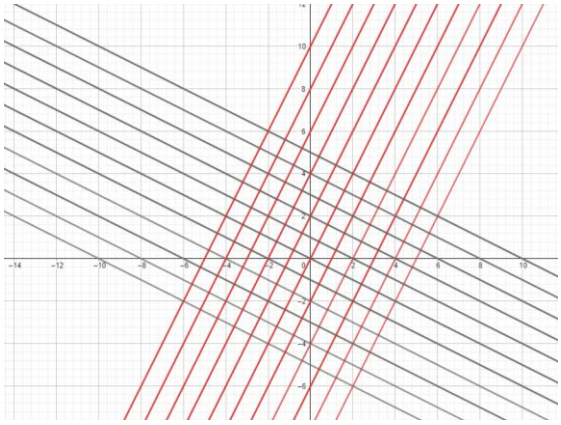
$$\frac{dy}{dx} = 2$$

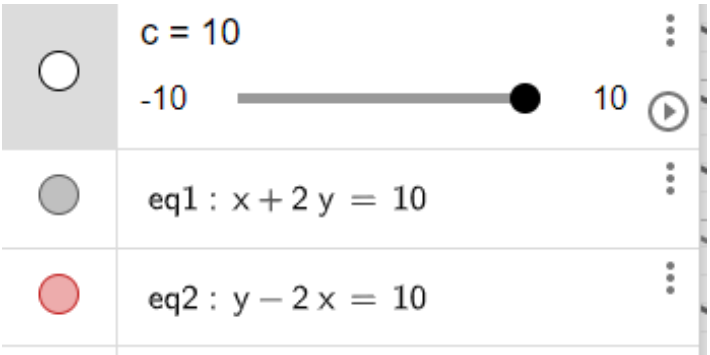
$$dy = 2dx$$

$$\int 1dy = \int 2dx$$

$$y = 2x + c$$

$$y - 2x = c$$





METODOS NUMERICOS EJERCICIOS SECCION 9.2 PAGINA 377

EJERCICIO 2

$$y' = f(x,y) = (x+y+1)^2 \, , y(0) = 2$$

$$y_{n+1} = y_n + h(w_1 k_1 + w_2 k_2)$$

$$w_2 = \frac{3}{4}, \qquad y_0 = 0.5, \qquad x_0 = 0$$

$$w_1 = 1 - w_2 = 1 - \frac{3}{4} = \frac{1}{4}$$

$$\alpha = \frac{1}{2w_2} = \frac{1}{\frac{3}{2}} = \frac{2}{3}$$

$$\beta = \frac{1}{2w_2} = \frac{1}{\frac{3}{2}} = \frac{2}{3}$$

$$k_1 = f(x_0, y_0)$$

$$k_1 = (x_0 + y_0 - 1)^2$$

$$k_1 = (0 + 2 - 1)^2$$

$$k_1 = 1$$

$$k_2 = f(x_0 + \alpha h \, , y_0 + \beta h k_1)$$

$$k_2 = [\left((x_0 + \frac{2}{3}h\,) + (y_0 + \beta\frac{2}{3}k_1)\right) - 1]^2$$

$$k_2 = [\left(0 + \frac{2}{3} * 0.1) + (2 + 0.1 * \frac{2}{3} * 1)\right) - 1]^2$$

$$k_2 = [0.0677 + 2.0677 - 1]^2$$

$$k_2 = 1.2844$$

$$y_1 = \; y_0 + h(\frac{1}{4}k_1 + \frac{3}{4}k_2)$$

$$y_1 = \; y_0 + \frac{h}{4}(k_1 + 3k_2)$$

$$y_1 = \; 2 + \frac{0.1}{4}(1 + 3 * 1.2844)$$

$$y_1 = 2.1213$$

x_n	$k_1 + 3k_2$	y_n	valor
0.0	4.5832	2	2
0.1	7.2663	2.1213	2.1230
0.2	11.1370	2.3030	2.3085
0.3	16.8500	2.5814	2.5958
0.4	30.2106	3.003	3.0650
0.5		3.7579	3.9082

EJERCICIO 7

$$y' = f(x,y) = e^x \, , y(0) = 0$$

$$y_{n+1} = y_n + \frac{h}{6}(k_1 + 2k_2 + 2k_3 + k_4)$$

$$k_1 = f(x_0, y_0) = e^{y*0} = 1$$

$$k_2 = f\left(x_0 + \frac{1}{2}h \, , y_0 + \frac{1}{2}hk_1\right) = e^{-(0+\frac{1}{2}*0.1*1)} = 0.9512$$

$$k_3 = f\left(x_0 + \frac{1}{2}h \, , y_0 + \frac{1}{2}hk_2\right) = e^{-(0+\frac{1}{2}*0.1*0.9512)} = 0.9536$$

$$k_4 = f\left(x_0 + \frac{1}{2}h \, , y_0 + \frac{1}{2}hk_3\right) = e^{-(0+\frac{1}{2}*0.1*0.9536)} = 0.9534$$

$$y_1 = y_0 + \frac{h}{6}(k_1 + 2k_2 + 2k_3 + k_4)$$

$$y_1 = 0 + \frac{0.1}{6}(1 + 2 * 0.9512 + 0.9536 + 0.9534)$$

$$y_1 = 0.0961$$

x_n	$k_1 + 2k_2 + 2k_3 + k_4$	y_n	$y_n = \ln(x+1)$	Error absoluto
0.0	5.763	0.00	0.00	0.0000
0.1	5.217	0.0961	0.0953	0.0008
0.2	4.800	0.1830	0.1823	0.0007
0.3	4.444	0.2630	0.2624	0.0006
0.4	4.137	0.3371	0.3365	0.0006
0.5		0.4055	0.4055	0.0006

EJERCICIO 10

$$y' = f(x,y) = xy + \sqrt{y}\,, y(0) = 1$$

$$y_{n+1} = y_n + \frac{h}{6}(k_1 + 2k_2 + 2k_3 + k_4)$$

$$k_1 = f(x_0, y_0) = x_0 * y_0 + \sqrt{y_0} = 1$$

$$k_2 = f\left(x_0 + \frac{1}{2}h\,, y_0 + \frac{1}{2}hk_1\right)$$

$$k_2 = \left(x_0 + \frac{1}{2}h\right)\left(y_0 + \frac{1}{2}hk_1\right) + \sqrt{y_0 + \frac{1}{2}hk_1}$$

$$k_2 = \left(0 + \frac{1}{2}0.1\right)\left(1 + \frac{1}{2}0.1 * 1\right) + \sqrt{1 + \frac{1}{2} * 0.1 * 1}$$

$$k_2 = 1.0772$$

$$k_3 = \left(x_0 + \frac{1}{2}h\right)\left(y_0 + \frac{1}{2}hk_2\right) + \sqrt{y_0 + \frac{1}{2}hk_2}$$

$$k_3 = \left(0 + \frac{1}{2} * 0.1\right)\left(1 + \frac{1}{2}0.1 * 1.0772\right) + \sqrt{1 + \frac{1}{2}0.1 * 1.0772}$$

$$k_3 = 1.0793$$

$$k_4 = \left(x_0 + \frac{1}{2}h\right)\left(y_0 + \frac{1}{2}hk_3\right) + \sqrt{y_0 + \frac{1}{2}hk_3}$$

$$k_4 = \left(0 + \frac{1}{2}0.1\right)\left(1 + \frac{1}{2}0.1 * 1.0793\right) + \sqrt{1 + \frac{1}{2} * 0.1 * 1.0793}$$

$$k_4 = 1.108$$

$$y_1 = y_0 + \frac{h}{6}(k_1 + 2k_2 + 2k_3 + k_4)$$

$$y_1 = 0 + \frac{0.1}{6}(1 + 2 * 1.0772 + 2 * 1.0793 + 1.108)$$

$$y_1 = 1.107$$

x_n	$k_1 + 2k_2 + 2k_3 + k_4$	y_n
0.0	6.4210	0.00
0.1	7.5420	1.1070
0.2	8.8150	1.2327
0.3	10.3391	1.3796
0.4	12.1740	1.5519
0.5		1.7548