Instituto Politécnico Nacional
Escuela Superior de Cómputo

Ecuaciones separables y reducibles a separables

Materia: Ecuaciones Diferenciales

Integrantes:

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Ejercicio 1

Saeed Priego Merino

1.- y' = 4x - 6

$$\frac{dy}{dx} = 4x - 6$$

$$dy = 4x - 6dx$$

$$\int dy \; = \int (4x-6)\, dx$$

$$y = \frac{4x^2}{2} - 6x + C$$

$$Solución\ general:$$

$$y = 2x^2 - 6x + C$$

Ejercicio 7

Diaz Torres Jonathan Samuel

7.- $y' = e^{-3x} + 2x$

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

$$dy = e^{-3x} + 2xdx$$

$$\int dy \; = \int e^{-3x} + 2x\, dx$$

$$\int dy \; = \int e^{-3x}dx + \int 2x\, dx$$

$$Solución\ general:$$

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

Ejercicio 13

Arellano Millan Gabriel

13.- $y' = \frac{3x^2\sqrt{16+y^2}}{y}$

$$\frac{y}{\sqrt{16+y^2}}\,dy = 3x^2\,dx$$

$$\int \frac{y}{\sqrt{16+y^2}}\,dy = \int 3x^2\,dx$$

$$\{t = x^3 + C \quad (\text{donde } t = \sqrt{16+y^2})$$

Ahora, integrando el lado derecho:

$$\int dt = \int 3x^2\,dx$$

$$t = x^3 + C_2$$

$$\sqrt{16+y^2} = x^3 + C_2$$

$$16 + y^2 = (x^3 + C_2)^2$$

$$y^2 = x^6 + 2C_2x^3 + C_2^2 - 16$$

$$\textit{Solución general}:$$

$$y = \pm\sqrt{x^6 + 2C_2x^3 + C_2^2 - 16}$$

Ejercicio 19

Ocaña Castro Hector

19.- $y' = \frac{\cos^2(x)}{y}$

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

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

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

$$\int y\,dy = \int y\,dy = \frac{1}{2}y^2 + C_1$$

$$\int \cos^2(x)\,dx = \int \frac{1+\cos(2x)}{2}\,dx = \frac{1}{2}x + \frac{1}{4}\sin(2x) + C_2$$

$$\frac{1}{2}y^2 + C_1 = \frac{1}{2}x + \frac{1}{4}\sin(2x) + C_2$$

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

$$y^2 - x + 2C = \frac{1}{2}\sin(2x) + 2C$$

$$y^2 - x = \frac{1}{2}\sin(2x) + C$$

$$y^2 - x = \frac{1}{2}\sin(2x) + C$$

$$y^2 = x + \frac{1}{2}\sin(2x) + C$$

$$\textit{Solución general}:$$

$$y = \pm\sqrt{x + \frac{1}{2}\sin(2x) + C}$$

Ejercicio 25

Vazquez Blancas Cesar Said

20.- $\frac{dr}{dt} = \frac{1}{2}\cos\left(\frac{1}{2}t\right)$

$$\frac{dr}{dt} = \frac{1}{2}\cos\left(\frac{1}{2}t\right)$$

$$dr = \frac{1}{2}\cos\left(\frac{1}{2}t\right)\,dt$$

$$\int_0^r dr = \int_\pi^t \frac{1}{2}\cos\left(\frac{1}{2}t\right)\, dt$$

$$u = \frac{1}{2}t$$

$$\frac{du}{dt} = \frac{1}{2} \Rightarrow du = \frac{1}{2}dt$$

$$r = \int_\pi^t \cos(u)\, du$$

$$r = \sin\left(\frac{1}{2}t\right) - \sin\left(\frac{1}{2}\pi\right) + C$$

$$Solución\ general:$$

$$r = \sin\left(\frac{1}{2}t\right) - 1$$

Ejercicio 31

Lopez Chavez Moises

31.- $y' = \frac{e^{-x}}{\sin(y)}, \quad y(1) = 0$

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

$$\sin(y)\, dy = e^{-x}\, dx$$

$$\int_0^y \sin(y)\, dy = \int_1^x e^{-x}\, dx$$

$$\int_0^y \sin(y)\, dy = -\cos(y)\Big|_0^y = -\cos(y) + \cos(0)\, dy = \int_1^x e^{-x}\, dx = -e^{-x}\Big|_1^x = -e^{-x} + e^{-1}$$

$$-\cos(y) + 1 = -e^{-x} + e^{-1}$$

$$Solución\ general:$$

$$\cos(y) = e^{-x} - e^{-1} + 1$$

Ejercicio 37

Vazquez Blancas Cesar Said

31.- $10xyy' = 1 - y^2$

$$10xy\frac{dy}{dx} = 1 - y^2$$

$$\int \frac{y}{(1-y)^2}\, dy = \int \frac{1}{10x}\, dx$$

$$u = 1 - y^2, \quad du = -2y\, dy, \quad dy = \frac{du}{-2y}$$

$$-\frac{1}{2}\int \frac{1}{u}\, du = \frac{1}{10}\int \frac{1}{x}\, dx$$

$$-\frac{1}{2}\ln|u| = \frac{1}{10}\ln|x| + C$$

$$-\frac{1}{2}\ln(1-y^2) = \frac{1}{10}\ln(x) + C$$

$$\ln(1-y^2) = -\frac{1}{5}\ln(x) + C_1$$

$$1 - y^2 = e^{-\frac{1}{5}\ln(x)+C_1}$$

$$1 - y^2 = x^{-\frac{1}{5}}e^{C_1}$$

$$\textit{Solución general}:$$

$$y = \pm\sqrt{1 - x^{-\frac{1}{5}}e^{C_1}}$$