

24/09/22

Lista 6					
	Ordem	grau	Linearidade	função incognita	Varia/Vel Independente
1.)	2 ^a	2 ^a	não	y	X
2.)	4 ^a	1 ^o	Sim	y	X
3.)	2 ^a	1 ^o	Sim	S	t
4.)	4 ^a	1 ^o	não	y	X
5.)	7 ^a	1 ^o	Sim	X	y
6.)	2 ^a	2 ^a	não	t	y
7.)	2 ^a	3/2 ^o	não	y	X
8.)	2 ^a	1 ^o	Sim	b	P
9.)	1 ^a	2 ^a	não	b	P

2a) $y' = \frac{1}{2}e^{-x/2}$

$-e^{-x/2} + e^{-x/2} = 0$ ✓

b) $y' = 24e^{-20t}$

$24e^{-20t} + 24 - 24e^{-20t} = 24$ ✓

c) $y' = 3e^{3x} \cdot \cos(2x) - e^{3x} \cdot 2\sin(2x)$
 $y'' = 5e^{3x} \cdot \cos(2x) - 12e^{3x} \cdot \sin(2x)$

$5e^{3x} \cdot \cos(2x) - 12e^{3x} \cdot \sin(2x) - 18e^{3x} \cdot \cos(2x) + 12e^{3x} \cdot \sin(2x) + 13e^{3x} \cdot \cos(2x)$ ✓

e) $P' = \frac{C_1 e^t \cdot (1 + C_1 e^t)}{(1 + C_1 e^t)^2} - C_1 e^t \cdot C_1 e^t \Rightarrow \frac{C_1 e^t + (C_1 e^t)^2 - (C_1 e^t)^2}{(1 + C_1 e^t)^2}$

$\frac{C_1 e^t}{(1 + C_1 e^t)^2} = \frac{C_1 e^t}{1 + C_1 e^t} \left(1 - \frac{C_1 e^t}{1 + C_1 e^t} \right) \Rightarrow \frac{C_1 e^t}{1 + C_1 e^t} = C_1 e^t - \frac{(C_1 e^t)^2}{1 + C_1 e^t}$

$$C_1 e^x + C_2 e^{-x} = 0 \Rightarrow C_1 e^x = -C_2 e^{-x} \Rightarrow C_1 = -C_2 e^{-2x} \quad \text{é explicita}$$

$$\frac{d}{dx} (C_1 e^x + C_2 e^{-x}) = 0 \Rightarrow C_1 e^x - C_2 e^{-x} = 0$$

$$(9) a) y' = m e^{mx}$$

$$m e^{mx} + 2 e^{mx} = 0 \Rightarrow m e^{mx} = -2 e^{mx} \Rightarrow m = -2$$

$$b) y'' = m^2 e^{mx}$$

$$m^2 e^{mx} - 5 m e^{mx} + 6 e^{mx} = 0$$

$$m = 2 \text{ ou } 3$$

$$(5) a) x y' - y^2 = 0 \Rightarrow x y' = y^2 \Rightarrow y' = \frac{y^2}{x}$$

$$b) e^x y' + e^{2x} y = \sin x \Rightarrow e^x y' = \sin x - e^{2x} y$$

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

$$c) (y' + y) 5 = \sin\left(\frac{y'}{x}\right) \Rightarrow 5y' + 5y = \sin\left(\frac{y'}{x}\right)$$

$$\Rightarrow 5y = \sin\left(\frac{y'}{x}\right) - 5y' \Rightarrow y = \frac{\sin\left(\frac{y'}{x}\right) - 5y'}{5}$$

$$d) (xy+3)dx + (2x-y^2+1)dy = 0 \quad \div dx$$

$$(xy+3) + (2x-y^2+1)\frac{dy}{dx} = 0$$

$$(2x-y^2+1)y' = -xy-3 \Rightarrow y' = \frac{-xy-3}{2x-y^2+1}$$

a) Linear

e) Exata

b) Bernoulli

f) Exata

c) Homogênea

g) Separável

d) Homogênea

h) Exata

3) a) $(y-x)y' = y-x-8$
 $y' = \frac{y-x-8}{y-x}$

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

$$\Rightarrow \frac{1}{2(x+2)^2} = \frac{x+4\sqrt{x+2}-x-8}{x+4\sqrt{x+2}-x} \Rightarrow 4\sqrt{x+2} = 2(x+2)^2(4\sqrt{x+2}-8)$$

$$\Rightarrow 4\sqrt{x+2} = (2x+4)4x \Rightarrow (4\sqrt{x+2})^2 = (8x^2+16x)^2$$

$$\Rightarrow 16x+32 = 64x^4+256x^2-16x-32 = 0 \quad (\div 16)$$

$$\Rightarrow 4x^4+16x^2-x-2=0$$

$$D = \mathbb{R}_+^*$$

Solução Implícita

1ª EDO

b) $y' = 2s + y^2$

$$y = s \operatorname{tg}(sx)$$
$$y' = 2s \sec^2(sx)$$

$$2s \sec^2(sx) = 2s + (s \operatorname{tg}(sx))^2 \Rightarrow 2s \sec^2(sx) = 2s + 2s \operatorname{tg}^2(sx)$$

$$\Rightarrow \sec^2(sx) = 1 + \operatorname{tg}^2(sx) \Rightarrow \sec^2(sx) = \sec^2(sx) = 0$$

$$D = \mathbb{R}$$

Solução Explícita

1ª EDO

tilibra

$$c) y'' = 2xy'$$

$$y = \frac{1}{(4-x^2)^{1/2}}$$

$$y' = \frac{-2x}{(4-x^2)^{3/2}}$$

$$D = \mathbb{R} - \{-2, 2\}$$

Solução Explícita

1ª EDO

$$d) 2y^2 = y^3 \cos x$$

$$y = (1 - \sin x)^{1/2}$$

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

$$\cos x (1 - \sin x)^{-1/2} = ((1 - \sin x)^{1/2})^3 \cos x$$

$$\cos x (1 - \sin x)^{-1/2} = \cos x (1 - \sin x)^{-3/2} = 0$$

1ª EDO

$$D = \mathbb{R}$$

Solução Explícita

$$7) x' = -2\sin(2t) + 2\cos(2t) + \frac{1}{5}e^t$$

$$x'' = -4\cos(2t) - 4\sin(2t) + \frac{1}{5}e^t$$

$$y' = 2\sin(2t) - 2\cos(2t) - \frac{1}{5}e^t$$

$$y'' = 4\cos(2t) + 4\sin(2t) - \frac{1}{5}e^t$$

$$y + e^t = 4(-\cos(2t) - \sin(2t) - \frac{1}{5}e^t) + e^t = -4\cos(2t) - 4\sin(2t) + \frac{1}{5}e^t$$

$$-e^t = 4(\cos(2t) + \sin(2t) + \frac{1}{5}e^t) - e^t = 4\cos(2t) + 4\sin(2t) - \frac{1}{5}e^t$$

X e Y são soluções do Sistema de Equações