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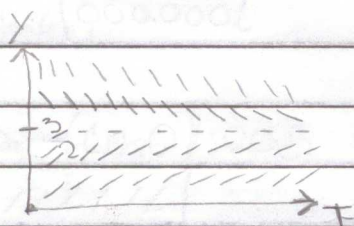
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Ex 2.8 EDO

1) $y' = 3 - 2y$

$$3 - 2y = 0$$

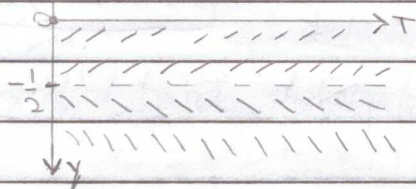
$$2y = 3 \quad y^* = \frac{3}{2}$$



5) $y' = 1 + 2y$

$$1 + 2y = 0$$

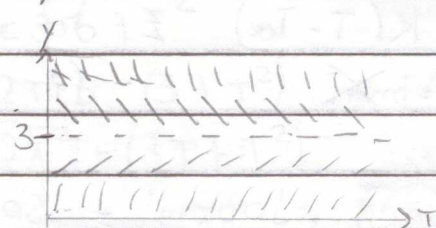
$$y^* = -\frac{1}{2}$$



7) $\frac{dy}{dt} = ay + b \quad y \geq 3$

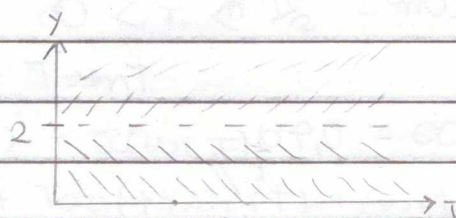
$$\frac{dy}{dt}$$

$$y' = 3 - y$$



9) $y' = y - 2 \quad y \geq 2$

$$y' = y - 2$$



15) O campo de direções corresponde à equação $y' = 2 - y$

16) O campo corresponde à equação c) $y' = y - 2$

17) O campo corresponde à equação g) $y' = -2 - y$

18) O campo corresponde à equação b) $y' = 2 + y$

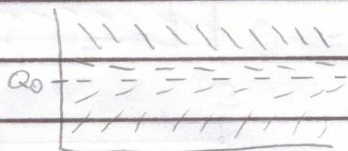
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$$21) \frac{dQ}{dt} = \frac{300 \cdot (0,05)}{h} - \frac{300 \cdot Q(t)}{10000000}$$

$$300 \left(\frac{0,05}{10000000} - \frac{Q(t)}{10000000} \right) = Q'(t)$$

$$22) b) Q(0) = 300 \left(\frac{0,05}{10000000} - \frac{Q(0)}{10000000} \right) = 0$$

$$Q(t) = 10 \text{ kg}$$



Assim, o quant. dada

limite não depende do qtd inicial

$$23) \frac{dT}{dt} = K(T - T_a) = \frac{dq}{dt} = -0,05(T - 70)$$

$$T = 70 \quad \frac{dT}{dt} = 0$$

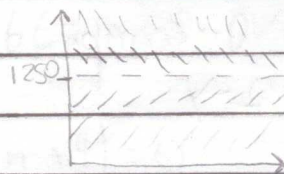
$$24) a) 5 \text{ mg} \cdot 100 \text{ cm}^3 = 500 \text{ mg}$$

$$q(t) = 0,9q$$

$$\frac{dq}{dt} = 500 - 0,9q$$

$$b) q' = 0 = -0,9(q - 1250) = 1250$$

$$q \rightarrow 1250$$



$$25) a) m\omega' = mg - K\omega^2$$

$$b) \omega' = 0 \quad -mg = -K\omega^2 \quad \omega = \sqrt{mg/K}$$

$$c) m = 10 \quad \omega = 4g \quad K = \frac{2}{4g}$$

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Ex 2.9

1) Segundo Ordem, Linear

3) Quarto Ordem, Linear

5) Segundo Ordem, não linear $d^2y + \sin(\pi+y)$

7) $y'' - y = 0$ $y_1 = e^t$, $y_2 = \cosh t$

$y = e^t = e^t - e^t = 0$ ✓

$y = \cosh t = y' = \sinh t$ $y'' = \cosh t$ ✓

9) $ty' - y = t^2$ $y_1 = 3t + t^2$

$y = 3t + t^2$ $t(3 + 2t) - (3 + t^2) \neq 0$ ✗

$y' = 3 + 2t$ $3t + 2t^2 - (3 + t^2) \neq 0$ ✗

13) $y'' + y = \sec t$ $0 < t < \frac{\pi}{2}$

$y = (\cos t) \ln \cos t + t \sec t$

$y' = -\sin(t) \ln \cos(t) + \sec(t)$ ✗

$y'' = -\cos(t) \ln(\cos t) + \tan(t) \sec(t) + \sec(t) - \sec(t)$

14) $y' - 2ty = 1$ $y = e^{t^2} \int_0^t e^{-s^2} ds + e^{t^2}$

?

0

Integre

Não elemento

15) $y' + 2y = 0$

$y = e^{\pi t}$

$y' = \pi e^{\pi t}$ $\pi e^{\pi t} + 2e^{\pi t} = 0$

$\pi e^{\pi t} = -2e^{\pi t}$ $\pi = -2$ //

$$16) y'' - y = 0$$

$$y' = \lambda e^{\lambda x}$$

$$y'' = \lambda^2 e^{\lambda x} \quad \lambda^2 e^{\lambda x} - e^{\lambda x} \rightarrow e^{\lambda x} (\lambda^2 - 1)$$

$$\lambda^2 = 1 \quad \lambda = \pm 1 //$$

$$17) y'' + y' - 6y = 0$$

$$\lambda^2 e^{\lambda x} + \lambda e^{\lambda x} - 6e^{\lambda x} = 0 \rightarrow e^{\lambda x} (\lambda^2 + \lambda - 6)$$

$$+1-4 \cdot (-6) = \Delta = 25 \quad \lambda = \frac{-1 \pm 5}{2} = \frac{4}{2} \text{ u } \frac{-3}{2}$$

$$(\lambda_1 = -3 \quad \lambda_2 = 2) //$$

$$19) x^2 y'' + 4xy' + 2y = 0 \quad y = x^\lambda$$

$$y' = \lambda x^{(\lambda-1)}$$

$$y'' = (\lambda^2 - \lambda) x^{\lambda-2}$$

$$x^2 (\lambda^2 - \lambda) x^{\lambda-2} + 4x \lambda x^{\lambda-1} + 2x^\lambda$$

$$(\lambda^2 - \lambda) x^\lambda + 4\lambda x^\lambda + 2x^\lambda$$

$$x^\lambda (\lambda^2 - \lambda + 4\lambda + 2) \rightarrow x^\lambda (\lambda^2 - \lambda + 4\lambda + 2)$$

$$(\lambda^2 + 3\lambda + 2) = 0 \quad 9 - 8 = \Delta = 1 \quad \lambda_1 = -1 \quad \lambda_2 = -2 //$$

$$20) x^2 y'' - 4xy' + 4y = 0$$

$$x^2 (\lambda^2 - \lambda) x^{\lambda-2} - 4x \lambda x^{\lambda-1} + 4x^\lambda$$

$$x^\lambda (\lambda^2 - \lambda - 4\lambda + 4)$$

$$x^\lambda (\lambda^2 - 5\lambda + 4) = 0$$

$$25 - 4 \cdot 4 = \Delta = 9 \quad 5 \pm \sqrt{9} = 5 \pm 3 \quad \lambda_1 = 4$$

$$\lambda_2 = 1 //$$

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