

10 ד'ערגן / 1720

$$\ddot{x} = x^2 + 3x - 10 = (x+5)(x-2) = -V'(x) \quad 1$$

$$V(x) = -\int (x^2 + 3x - 10) dx =$$

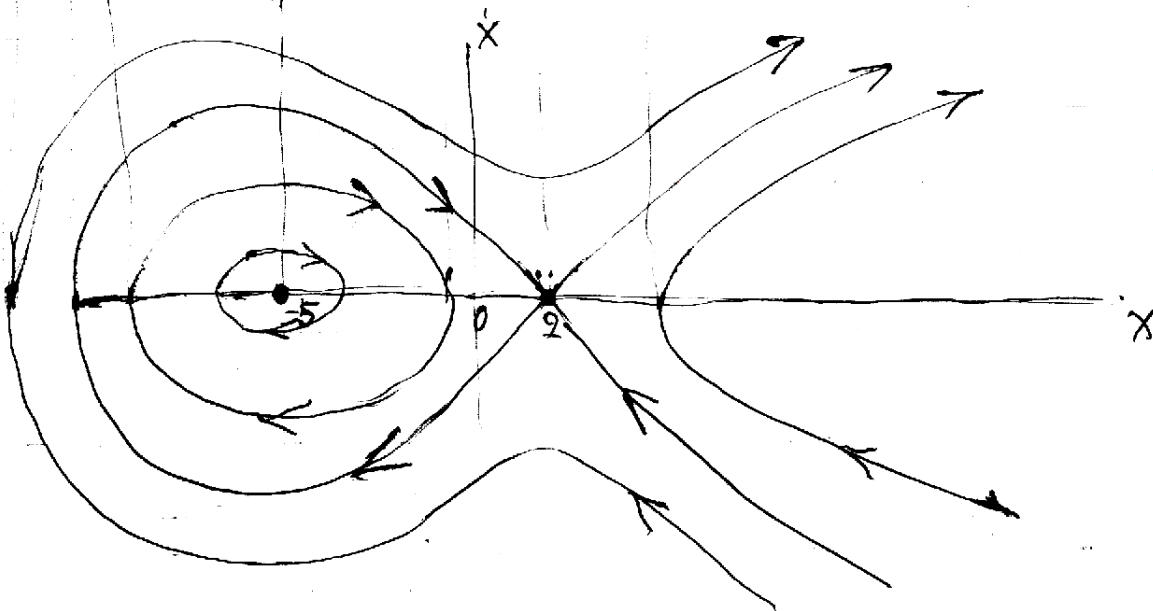
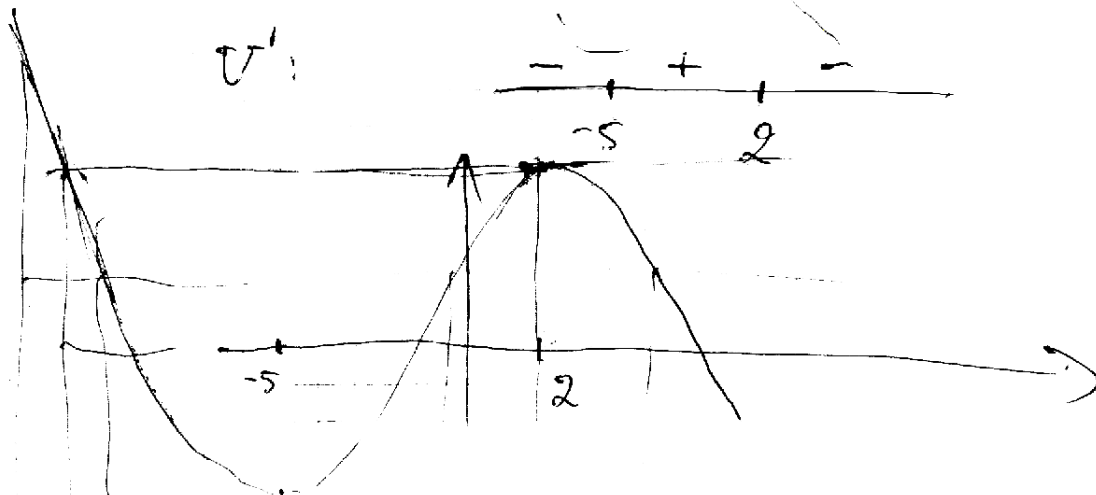
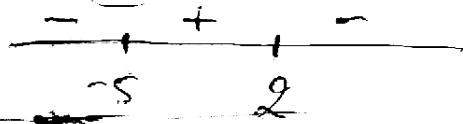
$$= -\frac{x^3}{3} - \frac{3}{2}x^2 + 10x + C \rightarrow 0$$

גלימה פון א צענטראלער פאקט

! געבן אד $V(-5) = +\frac{125}{3} - \frac{3}{2} \cdot 25 + 50 = 41\frac{2}{3} - 37\frac{1}{2} + 50 = 47$

$$V(2) = -\frac{8}{3} - \frac{3}{2} \cdot 4 + 20 = 14 - \frac{8}{3} = 11\frac{1}{3}$$

V' :



0.100 0.6 2.1eN 2.13 N 4

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

$$\dot{y} = x - 4y$$

$$\begin{vmatrix} -3-\lambda & 2 \\ 1 & -4-\lambda \end{vmatrix} =$$

$$= \lambda^2 + 7\lambda + 12 - 2 = \lambda^2 + 7\lambda + 10$$

$$\lambda_{1,2} = -5, -2$$

$$\lambda = -5$$

$$\begin{pmatrix} -3+5 & 2 \\ 1 & -4+5 \end{pmatrix} = \begin{pmatrix} 2 & 2 \\ 1 & 1 \end{pmatrix} \quad x+y=0 \quad e_1 = \begin{pmatrix} 1 \\ -1 \end{pmatrix}$$

$$\lambda = -2$$

$$\begin{pmatrix} -3+2 & 2 \\ 1 & -4+2 \end{pmatrix} = \begin{pmatrix} -1 & 2 \\ 1 & -2 \end{pmatrix} \quad x=2y \quad e_2 = \begin{pmatrix} 2 \\ 1 \end{pmatrix}$$

$$E = \begin{pmatrix} 1 & 2 \\ -1 & 1 \end{pmatrix}$$

$$\begin{pmatrix} x \\ y \end{pmatrix} = E \begin{pmatrix} x_1 \\ y_1 \end{pmatrix}$$

$$\begin{aligned} x &= x_1 + 2y_1 \\ y &= -x_1 + y_1 \end{aligned}$$

$$\det E = 1+2=3$$

$$E^{-1} = \frac{1}{3} \begin{pmatrix} 1 & 1 \\ -2 & 1 \end{pmatrix} = \frac{1}{3} \begin{pmatrix} 1 & -2 \\ 1 & 1 \end{pmatrix}$$

$$\begin{pmatrix} 1 & -2 \\ -1 & 1 \end{pmatrix} - \begin{pmatrix} 1 & 2 \\ -1 & 1 \end{pmatrix} = \begin{pmatrix} 3 & 0 \\ 0 & 3 \end{pmatrix} \quad \text{diag } 3, 3$$

$$x_1 = \frac{1}{3}(x-2y)$$

$$\dot{x}_1 = -5x_1 + \frac{1}{3}x^2$$

$$y_1 = \frac{1}{3}(x+y)$$

$$\dot{y}_1 = 2y_1 + \frac{1}{3}x^2$$

$$V = x_1^2 + y_1^2$$

$$\dot{V} = 2x_1(-5x_1 + \frac{1}{3}x^2) + 2y_1(-2y_1 + \frac{1}{3}x^2) =$$

$$= -2(5x_1^2 + 2y_1^2) + \frac{2}{3}(x_1 + y_1)x^2 =$$

$$= -2(5x_1^2 + 2y_1^2) + \frac{2}{3}(x_1 + y_1)(x_1 + 2y_1)^2$$

$$\dot{V} \leq -4V + \frac{2}{3} \cdot 2\sqrt{V} \cdot (3\sqrt{V})^2 = -4V + \frac{4}{3} \cdot 3 \cdot V^{\frac{3}{2}}$$

$$\dot{V} \leq 0 \Leftrightarrow (x, y) \neq 0 \quad r > 3$$

$$-4V + 12V^{\frac{3}{2}} \leq 0$$

$$3V^{\frac{3}{2}} < V$$

$$V^{\frac{1}{2}} < \frac{1}{3}$$

$$\Leftrightarrow V \neq 0$$

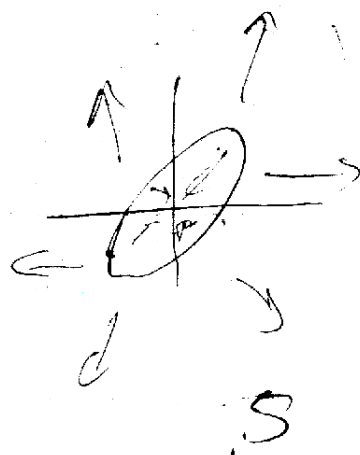
$$V > 0$$

$$\boxed{V < \frac{1}{9}} \Rightarrow \dot{V} < 0 \Rightarrow \text{אנרגיה קינטית}$$

$$V \leq 0.1 \Rightarrow \text{מרחק קטן ממוקד}$$

$$\frac{1}{9}(x-2y)^2 + \frac{1}{9}(x+y)^2 \leq 0.1$$

$$\boxed{(x-2y)^2 + (x+y)^2 \leq 0.9}$$



$$\begin{aligned} \dot{x} &= -3x + 2y + 0.01 \sqrt{\pi t^2 + x^2 + y^2} \\ \dot{y} &= x - 4y \end{aligned}$$

$$|\xi| \leq 0.01$$

$$\dot{x}_1 = -5x_1 + \frac{1}{3}\xi$$

$$\dot{y}_1 = -2y_1 + \frac{1}{3}\xi$$

$$\dot{V} = -2(5x_1^2 + 2y_1^2) + \frac{2}{3}(x_1 + y_1)\xi$$

$$\dot{V} \leq -4V + \frac{4}{3}0.01 \cdot V^{\frac{1}{2}}$$

$$\dot{V} \leq 0 \Rightarrow$$

$$\frac{4}{3}0.01 V^{\frac{1}{2}} \leq 4V$$

$$V^{\frac{1}{2}} \geq \frac{1}{3} \cdot 10^{-2}$$

$$(\Rightarrow V \neq 0)$$

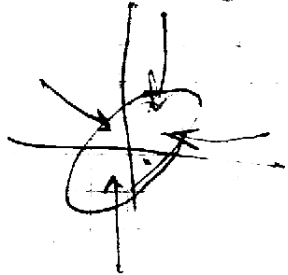
$$V \geq 10^{-4} \cdot \frac{1}{9}$$

$$(x-2y)^2 + (x+y)^2 \geq 10^{-4}$$

$$V = 0 \text{ d/NZ}$$

$$(x-2y)^2 + (x+y)^2 \geq 10^{-3}$$

$$\rho' \wedge \rho' \sigma$$



$\Rightarrow$

$$\rho \in N \cap \Lambda \wedge \wedge$$

$$(x-2y)^2 + (x+y)^2 \leq 10^{-3}$$