

Τεστάρτη 20 Μαΐν

→ $\dot{x} = x(1-x) - r = f(x) \quad \begin{matrix} r > 0 \\ x \geq 0 \end{matrix}$

$$x^2 - x + r = 0$$

$$x_e(r) = \frac{1}{2} \pm \sqrt{\frac{1}{4} - r}$$

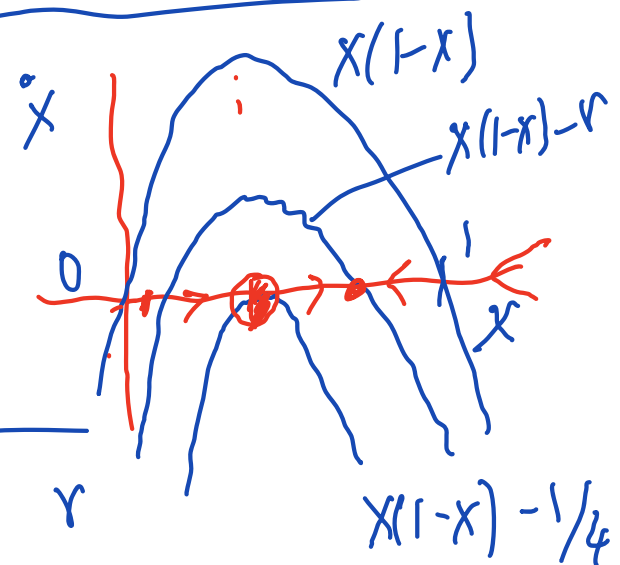
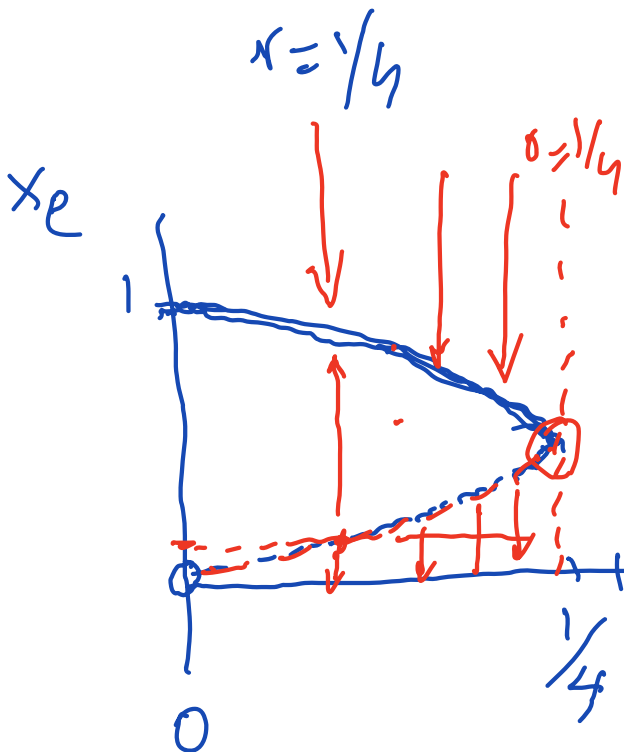
$$r < 1/4$$

$$r > 1/4$$

$$x_e(r) = \frac{1}{2} \pm \sqrt{\frac{1}{4} - r}$$

δύο ανάποδα
συντεταγμένες
180 μοίρες

bifurcation point



(Saddle-node bifurcation
supercritical)

Ergebnis $f'(x_e) = 1 - 2x_e$

$$f'(x_e) = 1 - 2 \left[\frac{1}{2} \pm \sqrt{\frac{1}{4} - r} \right]$$

$$= \mp 2 \sqrt{\frac{1}{4} - r}$$

Ergebnis

$x_e = \frac{1}{2} + \sqrt{\frac{1}{4} - r}$ $f'(x_e) < 0$

$x_e = \frac{1}{2} - \sqrt{\frac{1}{4} - r}$ $f'(x_e) > 0$
 Ergebnis

no real form

$$\dot{x} = r + x^2$$

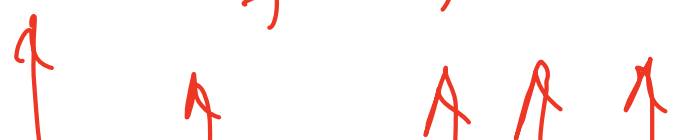
van Kampen's
Saddle-node

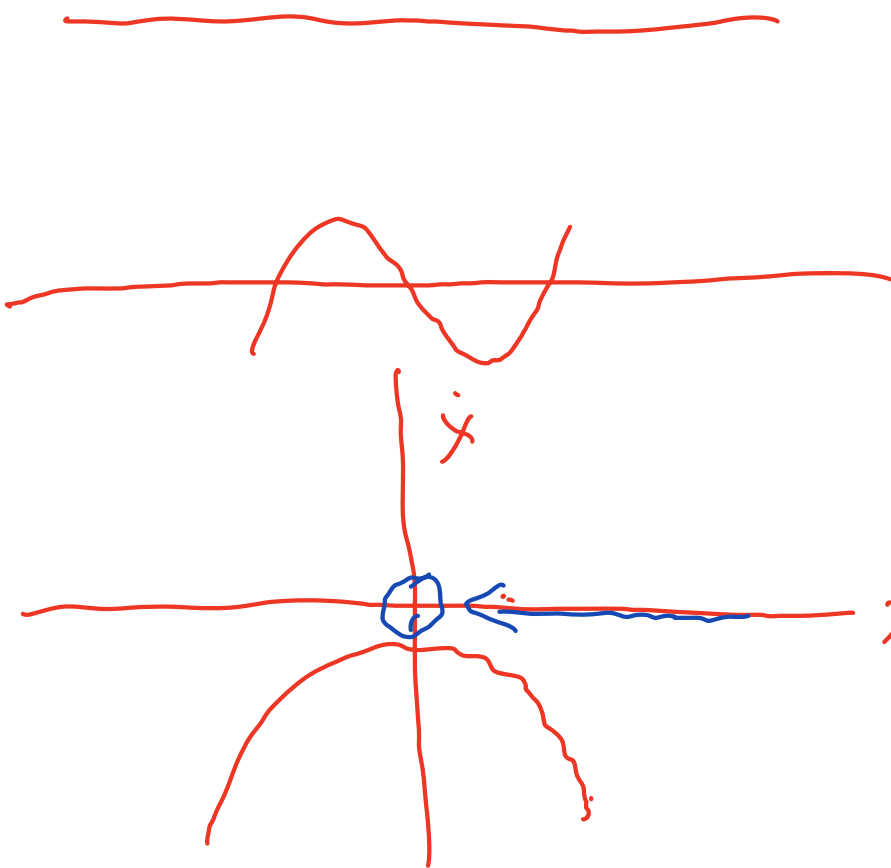
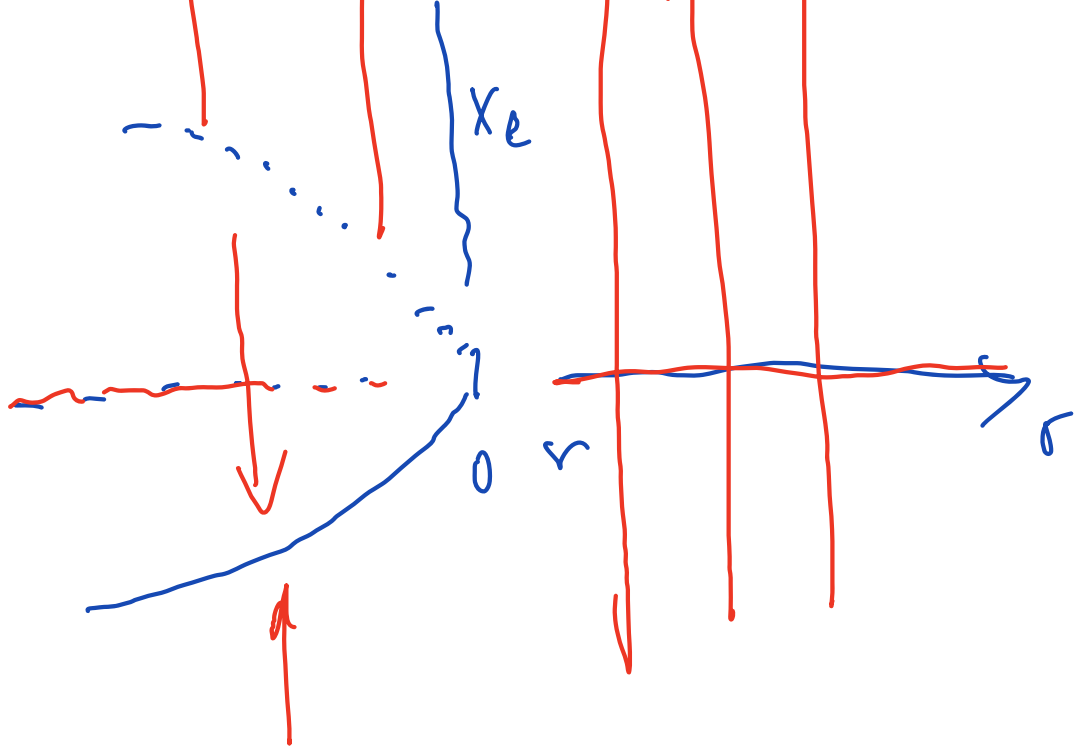


$r < 0$

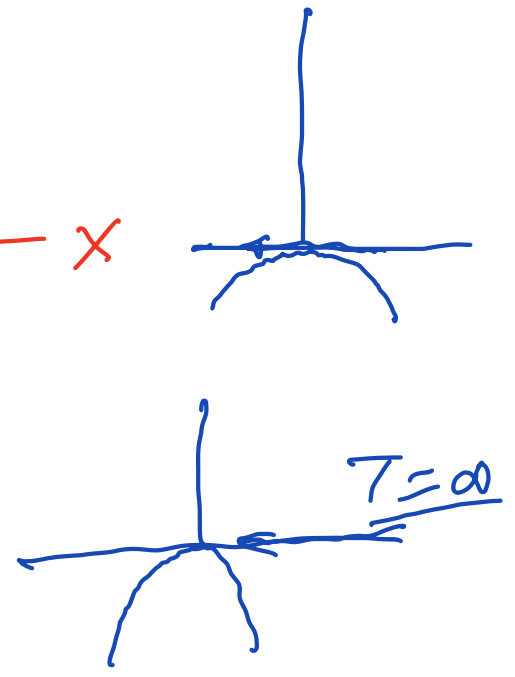
$$x_e = \pm \sqrt{-r}$$

$$f'(x_e) = \pm 2\sqrt{-r}$$





↓
 Kritisches
 Verhalten



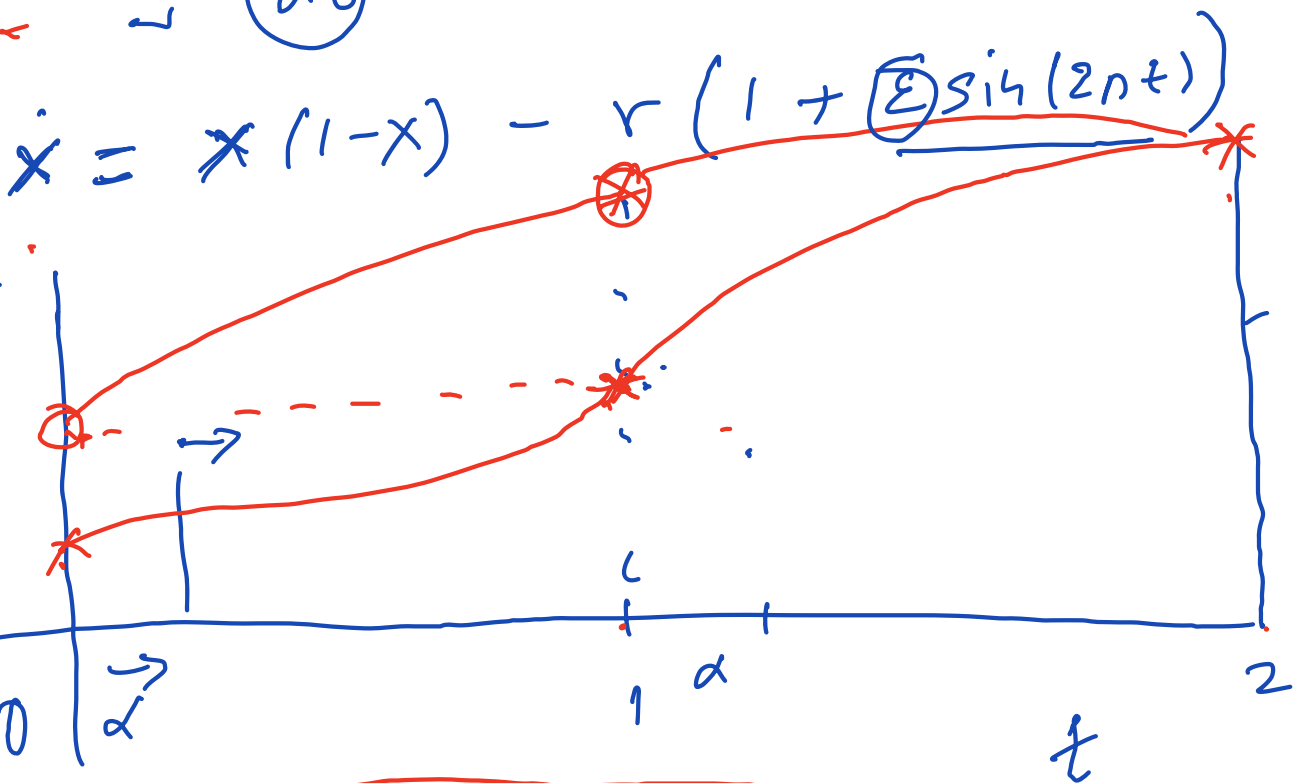
$\dot{x} = x(1-x) - r(t) \leftarrow$ Poincaré

$$X = X e \quad \forall t$$

δt und X_n auf t $T=1$
100 Prozent

$$s(t) = a_0 + \sum a_n \sin(2\pi n t + \varphi_n)$$

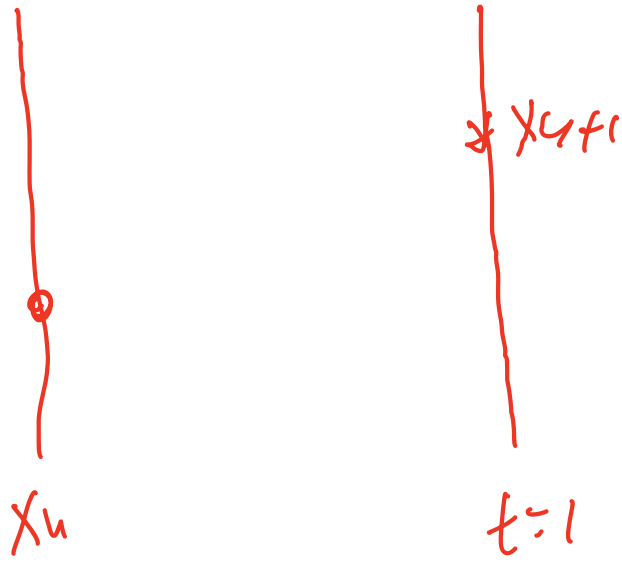
$$\approx a_0 + a_1 \sin(2\pi t)$$



$$P(X(t)) = x(t+1)$$

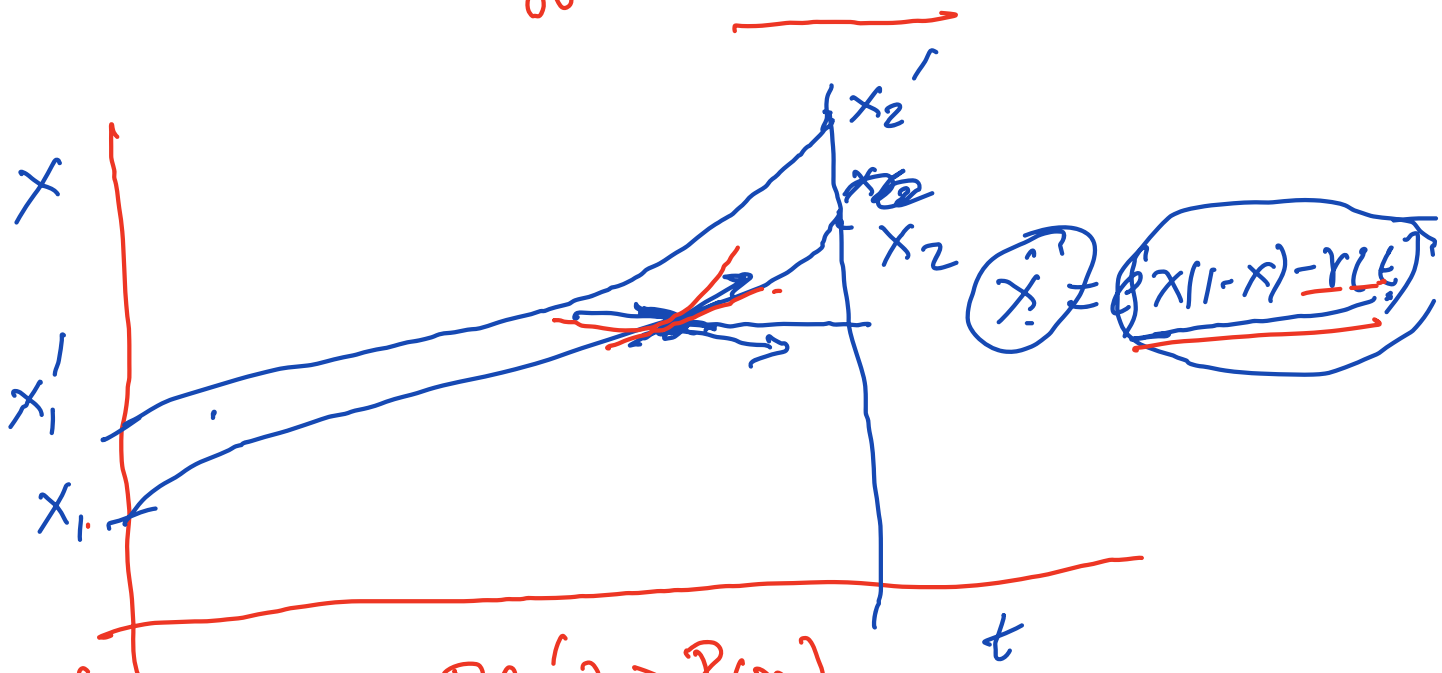
↳ n+1.000

$$x_{n+1} = P(x_n)$$



α) $x_{t+1} = P(x_t) \geq x_t$
μονότονη

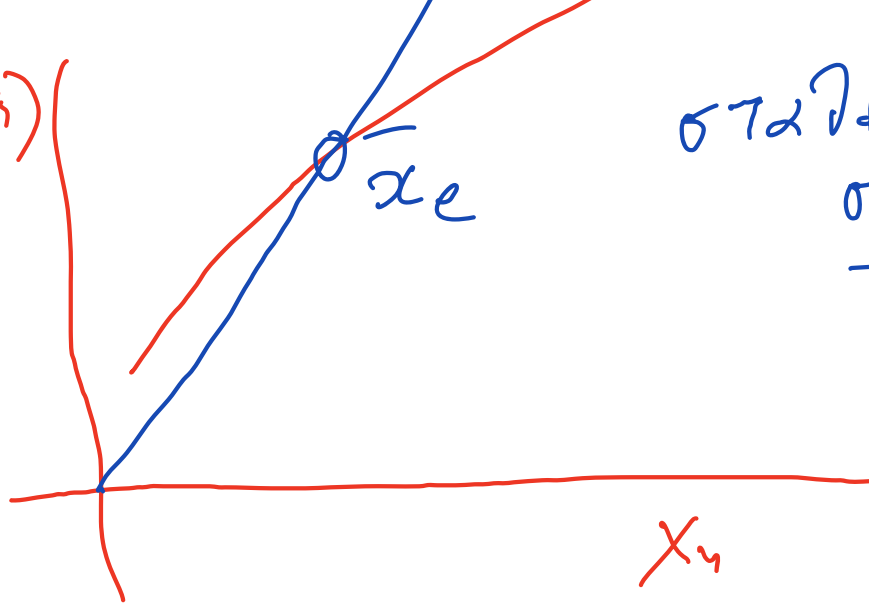
αυτοκαταρτική σε μονοδιάστατο
 συστήματα



$x_1' > x_1 \Rightarrow P(x_1') > P(x_1)$

$x_{t+1} = x_t$

$$x_{t+1} = f(x_t)$$



$\sigma f'(x_e)$
 $\sigma f'(x_e)$

x_t

