

$$g \quad X_{j+1} = \frac{1}{7} \times X_j (1 - X_j)$$

$$\bar{X} = \frac{1}{7} \times \bar{X} (1 - \bar{X})$$

$$\bar{X} (1 - \frac{1}{7} \times (1 - \bar{X})) = 0$$

$$\bar{X}_1 = 0 \quad \frac{1}{7} \times (1 - \bar{X}) = 1$$

$$1 - \bar{X} = \frac{7}{1}$$

$$\bar{X}_2 = 1 - \frac{7}{1} = \frac{1-7}{1}$$

$$\left| \frac{dF}{dx} / \bar{X}_1 \right| \leq 1$$

$$\frac{dF}{dx} = \frac{1}{7} \times 1 - \frac{2}{7} \times \bar{X}$$

$$\frac{dF}{dx} / \bar{X}_1 = \frac{1}{7} \times 1$$

$$|x| \leq 7 \Rightarrow 0 < x \leq 7$$

$$\left| \frac{dF}{dx} / \bar{X}_2 \right| \leq 1$$

$$\frac{dF}{dx} / \bar{X}_2 = \frac{1}{7} \times 1 - \frac{2}{7} \times 1 + \frac{2}{7} \times \frac{7}{1} \times \frac{7}{1} = \frac{1}{7} \times 1 - \frac{2}{7} \times 1 + \frac{2}{7} \times 49$$

$$\ominus - \frac{1}{7} \times 1 + 2$$

$$1 - \frac{1}{7} \times 1 + 2 \leq 1$$

$$2 - \frac{1}{7} \times 1 \leq 1$$

$$x \geq 7$$

$$2 - \frac{1}{7} \times 1 > 0$$

$$x < 14$$

$$7 \leq x < 14$$

$$\frac{1}{7} \times 1 - 2 \leq 1$$

$$x \leq 21$$

$$\frac{1}{7} \times 1 - 2 > 0$$

$$x > 14$$

$$\Rightarrow 14 < x \leq 21$$

$$x \in [4, 7, 8, 15, 20,$$

$$22, 26, 28, 36]$$

$$23, 24$$

$$(2, 4, 8, 16, 32, \infty)$$

$$23, 24, 25, 25, 2$$

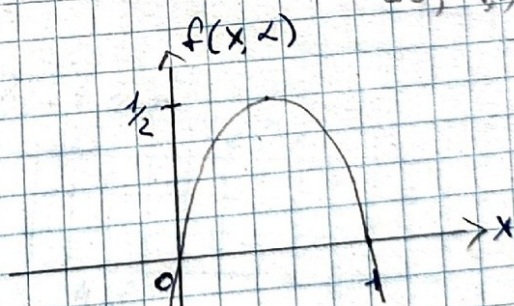
$$\frac{df}{dx} = 0$$

$$\frac{1}{7} \times 1 - \frac{2}{7} \times x = 0$$

$$x^* = \frac{1}{2} \Rightarrow x = 0$$

$$\frac{1}{7} \times x (1 - x) = 0$$

$$\bar{X}_1 = 0 \quad \bar{X}_2 = 1$$



Функция $f(x, x)$ близка к квадратич. параболе вблизи экстремума \Rightarrow соотношение Рейнбаума применимо.

$$10. \frac{dx}{dt} = \sigma(y-x)$$

$$\frac{dy}{dt} = rx - y - xz$$

$$\frac{dz}{dt} = xy - bz$$

$$\sigma = 4 \quad b = 2$$

$$\begin{cases} \sigma(y-x) = 0 \\ rx - y - xz = 0 \\ xy - bz = 0 \end{cases} \quad y = x$$

$$\begin{cases} \bar{x} = 0 \\ \bar{y} = 0 \\ \bar{z} = 0 \end{cases} \quad \text{или} \quad \begin{cases} \bar{x} = \bar{y} = 1 \\ \bar{z} = r-1 \end{cases}$$

Рациональные точки

- 1) $(0, 0, 0)$ и $(1, 1, r-1)$
- 2) $(\sqrt{b(r-1)}, \sqrt{b(r-1)}, r-1)$
- 3) $(-\sqrt{b(r-1)}, -\sqrt{b(r-1)}, r-1)$

Матрица Якоби:

$$1) \quad A = \begin{pmatrix} -\sigma & \sigma & 0 \\ r-2 & -1 & -x \\ y & x & -b \end{pmatrix}$$

$$2) \quad A = \begin{pmatrix} -4 & 4 & 0 \\ r & -1 & 0 \\ 0 & 0 & -2 \end{pmatrix}$$

$$\begin{aligned} (-4-\lambda)(-1-\lambda)(-2-\lambda) - 4r(-2-\lambda) &= 0 \\ (-2-\lambda)((-4-\lambda)(-1-\lambda) - 4r) &= 0 \end{aligned}$$

$$\lambda_1 = -2 \quad \lambda_2 = \frac{-5 + \sqrt{9+16r}}{2} \quad \lambda_3 = \frac{5 + \sqrt{9+16r}}{2}$$

$$9+16r \geq 0$$

$$r \geq -\frac{9}{16}$$

$$\Rightarrow \text{при } r \in [-\frac{9}{16}; 1) \quad \lambda_2 \leq 0$$

$$\lambda_3 \geq 0 \quad \text{при любых } r$$

при $r \in [-\frac{9}{16}; 1)$ устойчив

при $r = 1$ неустойчив

при $r > 1$ неустойчив