

2) start 4
goal 8

$$p = \frac{1}{4}$$

$$x = \frac{1 - \frac{1}{4}}{\frac{1}{4}} = 3$$

$$\frac{x^4 - x^8}{1 - x^8} = \frac{3^4 - 3^8}{3^8 - 1} = \frac{3^4(3^4 - 1)}{3^8 - 1}$$

$$= \frac{3^4}{3^4 + 1} = \frac{81}{82}$$

$$= 98,8\%$$

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

$$\frac{x^4}{x^4 + 1} < \frac{1}{2}$$

$$2x^4 < x^4 + 1$$

$$x^4 < 1$$

$$x < 1$$

$$p = \frac{3}{4}$$

$$x = \frac{1 - \frac{3}{4}}{\frac{3}{4}} = \frac{1}{3}$$

$$\Rightarrow \frac{\frac{1}{3^4}}{\frac{1}{3^4} + 1} = \frac{1}{3^4 + 1} = \frac{1}{82}$$

$$= 1,2\%$$

$$5) x_{h+2} - \frac{3}{2} x_{h+1}^2 + 2x_h = 0$$

$$\bar{x} - \frac{3}{2} \bar{x}^2 + 2\bar{x} = 0$$

$$\bar{x} = 0$$

$$-\frac{3}{2} \bar{x} = -3 \quad \bar{x} = 2$$

$$\begin{cases} x_{h+1} = y_h \\ y_{h+1} = -2x_h + \frac{3}{2} y_h^2 \end{cases}$$

$$\begin{bmatrix} 0 & 1 \\ -2 & \frac{3}{2} y \end{bmatrix}$$

(2,0)

$$\begin{bmatrix} 0 & -\lambda & 1 \\ -2 & 0 & -\lambda \end{bmatrix}$$

$$\lambda^2 + 2 = 0$$

INST

$(\frac{1}{2}, \frac{1}{2})$

$$\begin{bmatrix} 0 & 1 \\ -2 & \frac{6}{\lambda^2} \end{bmatrix}$$

$$\lambda^2 - \frac{6}{\lambda^2} \lambda + 2 = 0$$

$$\frac{6}{\lambda^2} < 1 - 2 < 2$$

↑
max

INST.

1) $2\bar{p} + \alpha\bar{p} - \alpha\bar{p} = 2 \quad \bar{p} = 1$

$$2\lambda^2 + \alpha\lambda - \alpha = 0$$

$$\lambda^2 + \frac{\alpha}{2}\lambda - \frac{\alpha}{2} = 0$$

$$\frac{\alpha}{2} < 1 - \frac{\alpha}{2} < 2$$

$$\begin{cases} \boxed{\alpha < 1} & \text{GAS} \\ \alpha > -2 & \checkmark \end{cases}$$

$\alpha > 1$ UNST

$\alpha = 1$

$$\lambda^2 + \frac{1}{2}\lambda - \frac{1}{2} = 0$$

$$\lambda = \frac{1}{2}, -1$$

$$p_h = c_1 (-1)^h + c_2 \left(\frac{1}{2}\right)^h$$

SIMPLY
STABLE

$$\begin{cases} \dot{Y} = -\alpha Y + \beta G - \bar{G} \\ \dot{G} = -k G - h \int_0^t Y(\tau) d\tau \end{cases}$$

$$\begin{cases} \dot{Y} = -\alpha Y + \beta G - \bar{G} \\ \dot{G} = Z \\ \dot{Z} = -k Z - h Y \end{cases}$$

$$\begin{aligned} G &= \bar{G} \\ Z &= 0 \\ Y &= 0 \end{aligned}$$

$$\begin{vmatrix} -\alpha - \lambda & \beta & 0 \\ 0 & 0 - \lambda & 1 \\ -h & 0 & -k - \lambda \end{vmatrix} = \lambda(\alpha + \lambda)(-k - \lambda) - \beta h$$

$$= -\lambda^3 - (\alpha + k)\lambda^2 - \alpha k \lambda - \beta h$$

$$-\alpha k - \alpha \lambda - k \lambda - \lambda^2$$

$$\left[\begin{array}{cc|c} \alpha + k & \beta h & 0 \\ 1 & \alpha k & 0 \\ \hline 0 & \alpha + k & \beta h \end{array} \right]$$

$$2k(\alpha + k) > \beta h$$

$$\begin{aligned} \alpha &= 1 & k &= 2 \\ \beta &= 3 \end{aligned}$$

$$6 > 3h$$