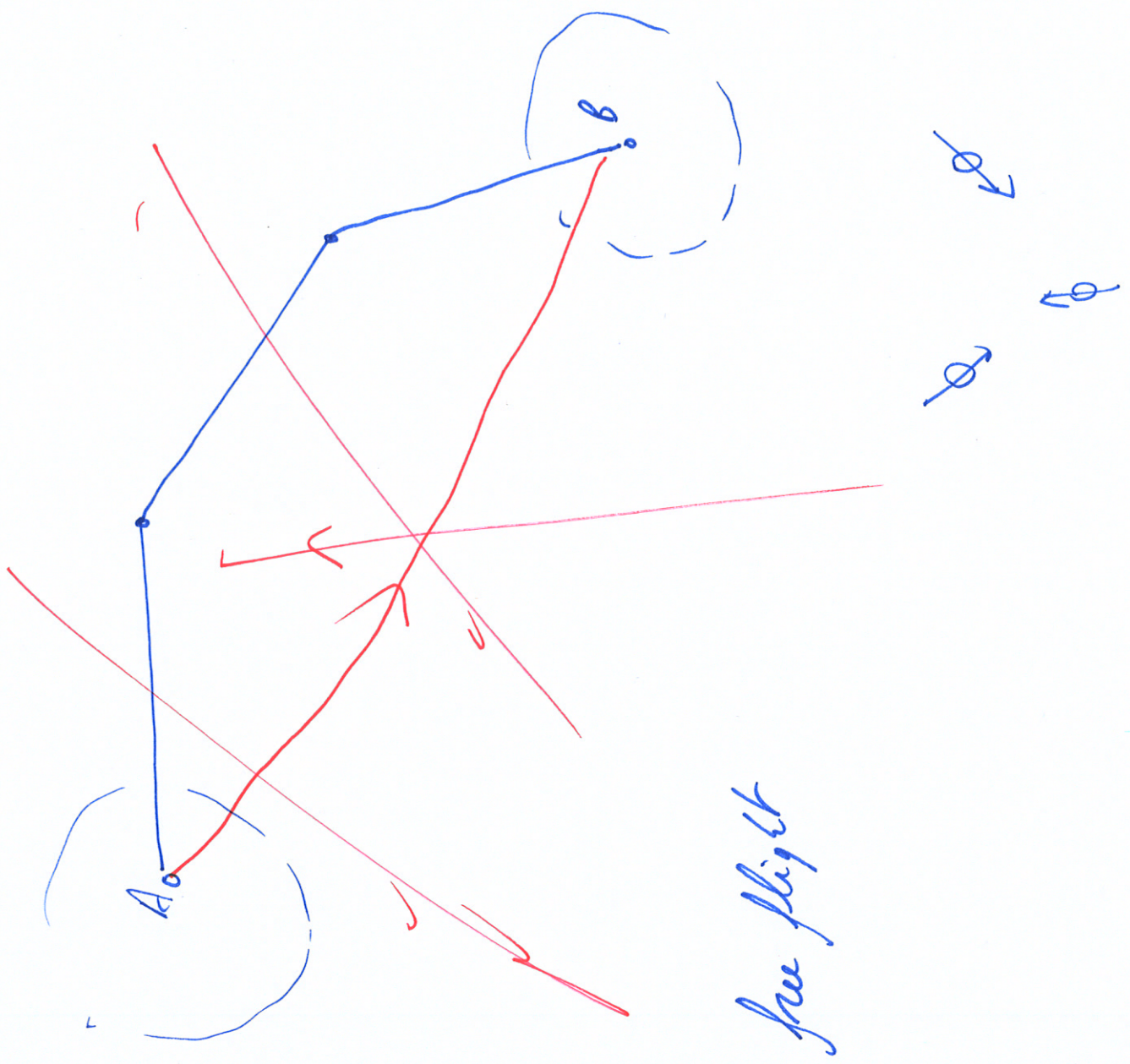
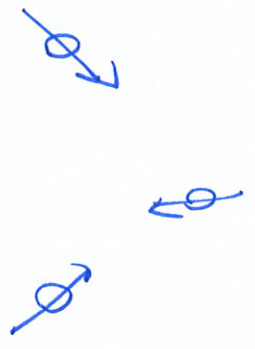


Hybrid

23-04-2019 ①



free flight

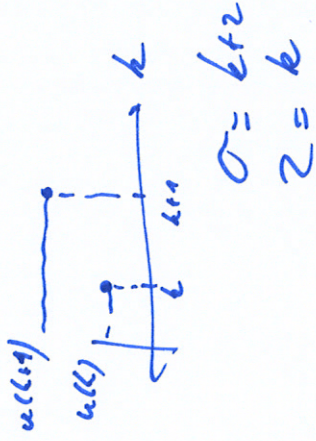
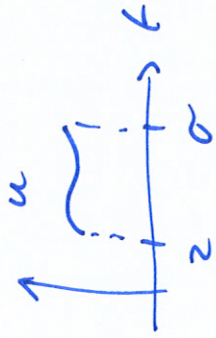


②

$$x(\sigma) = \phi(z, \sigma, x(z), u) \quad \leftarrow \begin{array}{l} \text{signal for interval} \\ [z, \sigma] \end{array}$$

$$1) \dot{x}(t) = f(x(t), u(t)) \quad \sigma$$

$$x(\sigma) = x(z) + \underbrace{\int_z^\sigma f(x(t), u(t)) dt}_{\phi}$$



$$2) x(k+1) = f(x(k), u(k))$$

$$x(k+2) = f(x(k+1), u(k+1))$$

$$= f(f(x(k), u(k)), u(k+1))$$

⋮

$$x(k+n) = f(f(\dots f(x(k), u(k)), u(k+1)), \dots, u(k+n-1))$$

$\phi$

③

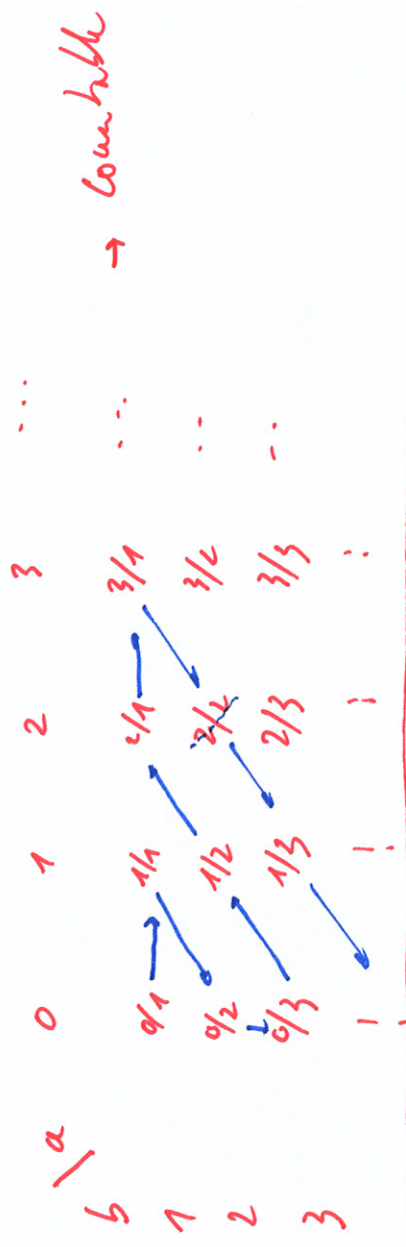
$\mathbb{N} = \{0, 1, 2, \dots\}$  → Countable

$\mathbb{Z} = \{\dots, -2, -1, 0, 1, 2, \dots\}$

$= \{0, +1, -1, +2, -2, \dots\}$  → Countable

$\mathbb{Q} = \left\{ \frac{a}{b} \mid a \in \mathbb{Z}, b \in \mathbb{N} \setminus \{0\} \right\}$

↳ assume  $a, b \geq 0$



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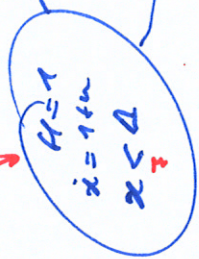
$\mathbb{R}$  not countable

$\mathbb{Z} \times \mathbb{Z} = \{(a, b) \mid a, b \in \mathbb{Z}\}$   
→ Countable

(170)

(17)

$x=2A$

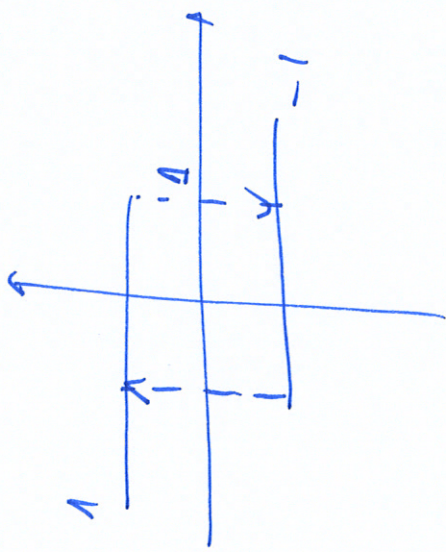


G

option 1 :  $x = A$

option 2 :  $x > A$

difference for initial state



option 1 - deadlock  
 option 2 - no deadlock.