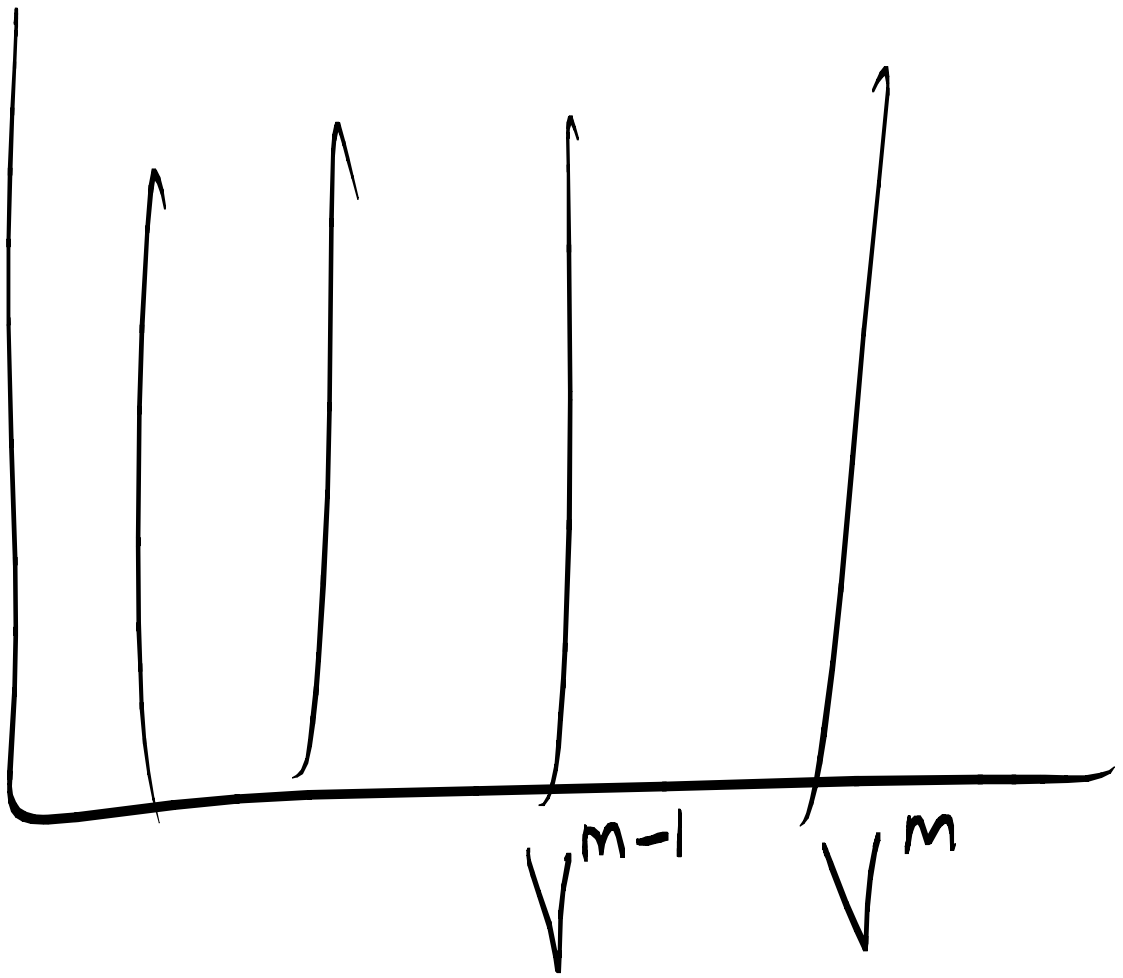
$V(S_1, S_2, t)$

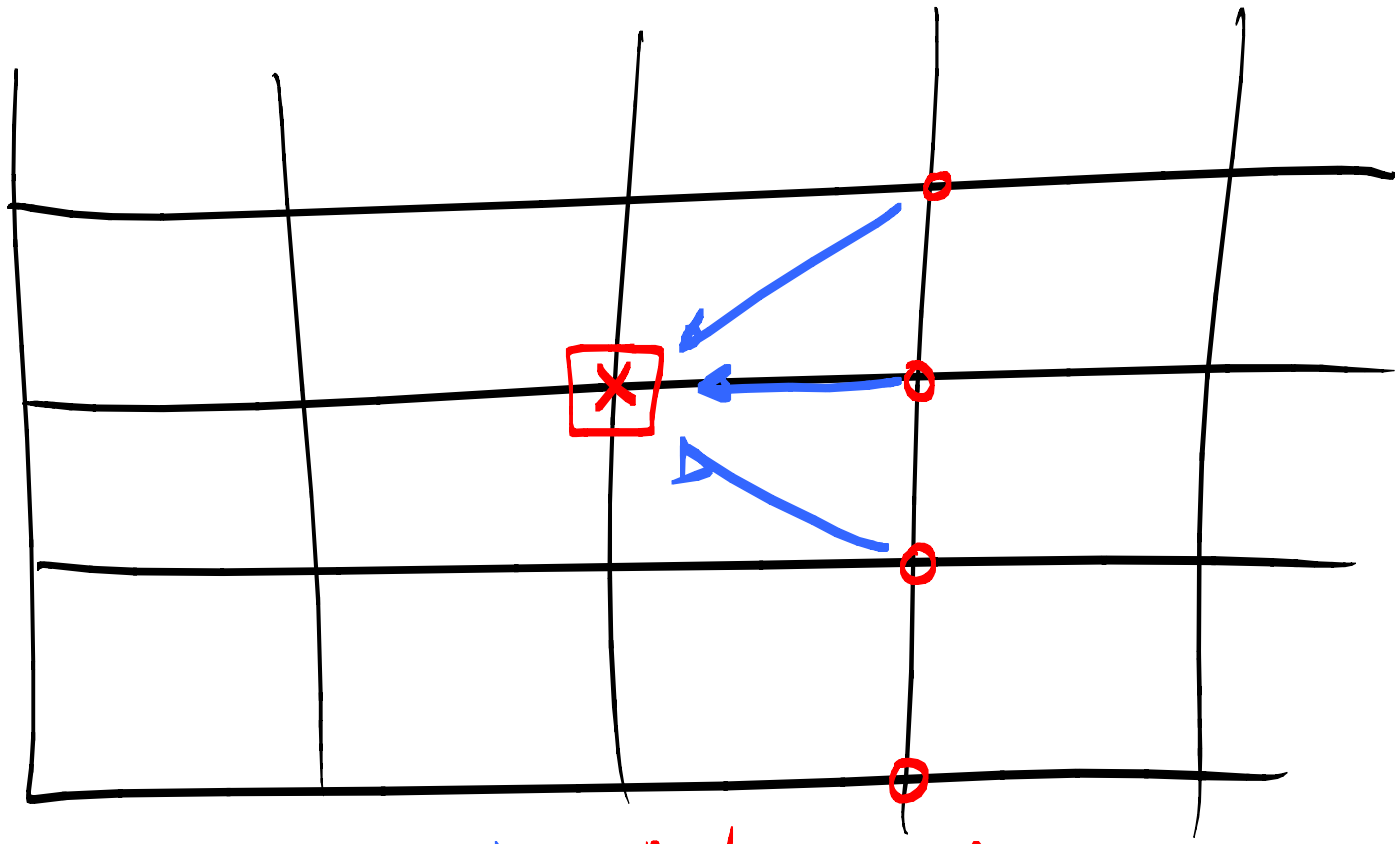
$V(S, r, t)$

$V(r, l, t)$

} 2 factor models


V^{m-1}
V^{m}

$$y_{n+1} = \underbrace{f(y_n, y_{n-1})}_{\text{known}}$$

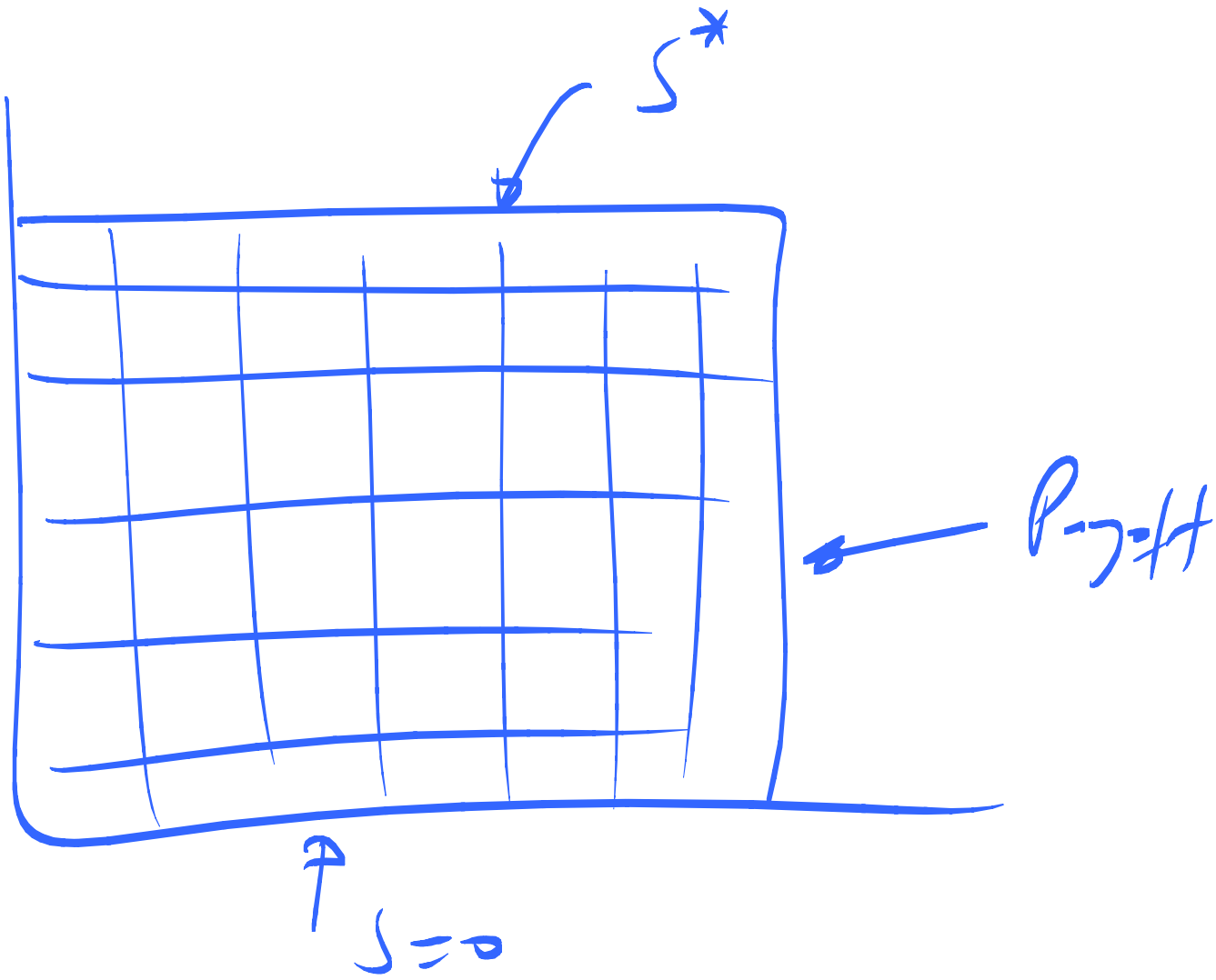


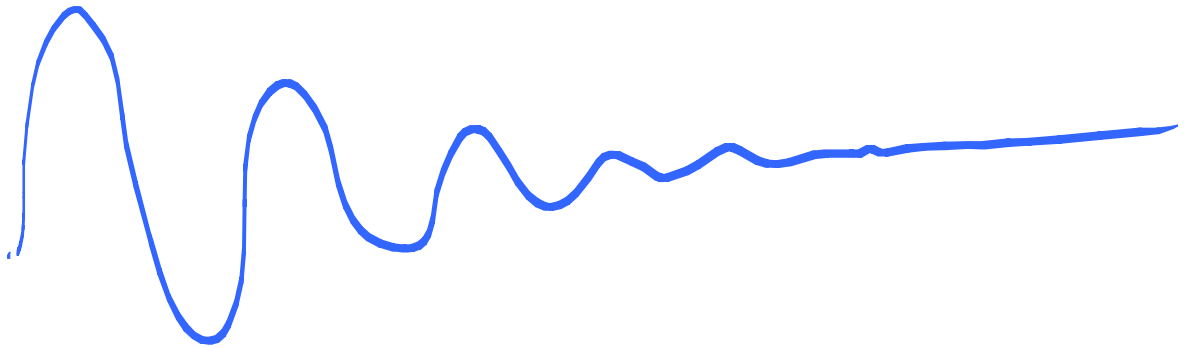
$y_{n+1} = f(y_n)$

$V_n^{m-1} = f\left(V_{n-1}^{m}, V_n^{m}, V_{n+1}^{m}\right)$

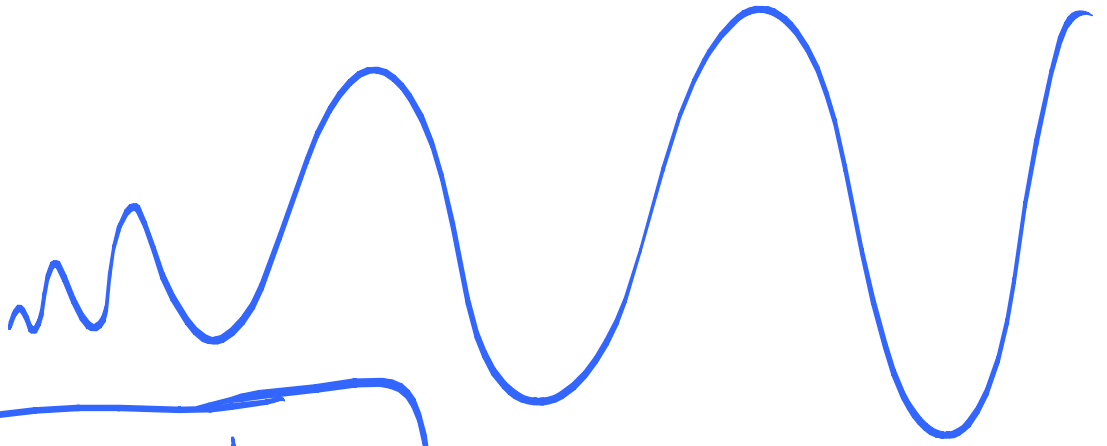
V^{m-1} V^{m}

$$y = \underbrace{f(x)}_{\text{known}}$$


S^*
$S=0$



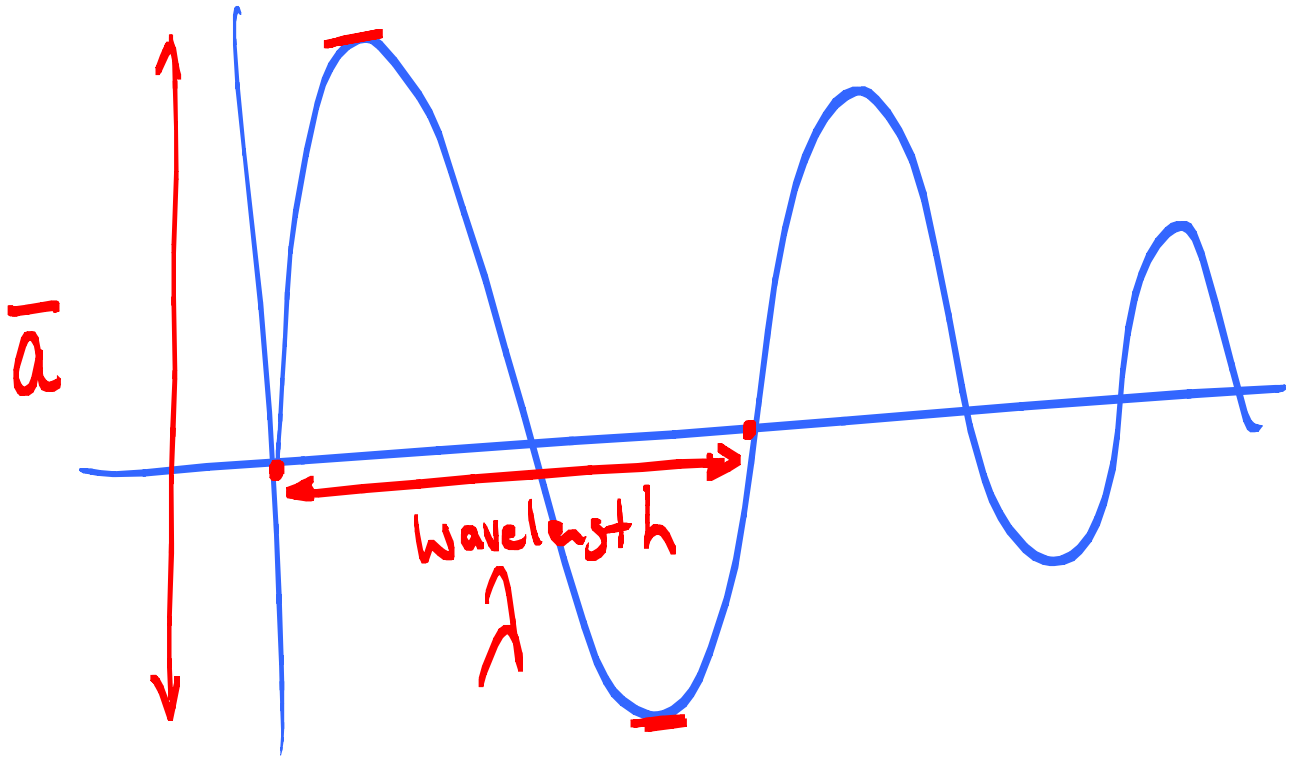
stable



instability

$$\delta t \leq \frac{1}{\delta^2 N^2}$$

$$\delta t \sim \frac{1}{N^2}$$



$\bar{a}$ amplitude

freq. $= \frac{1}{T}$

cycles per second

ω

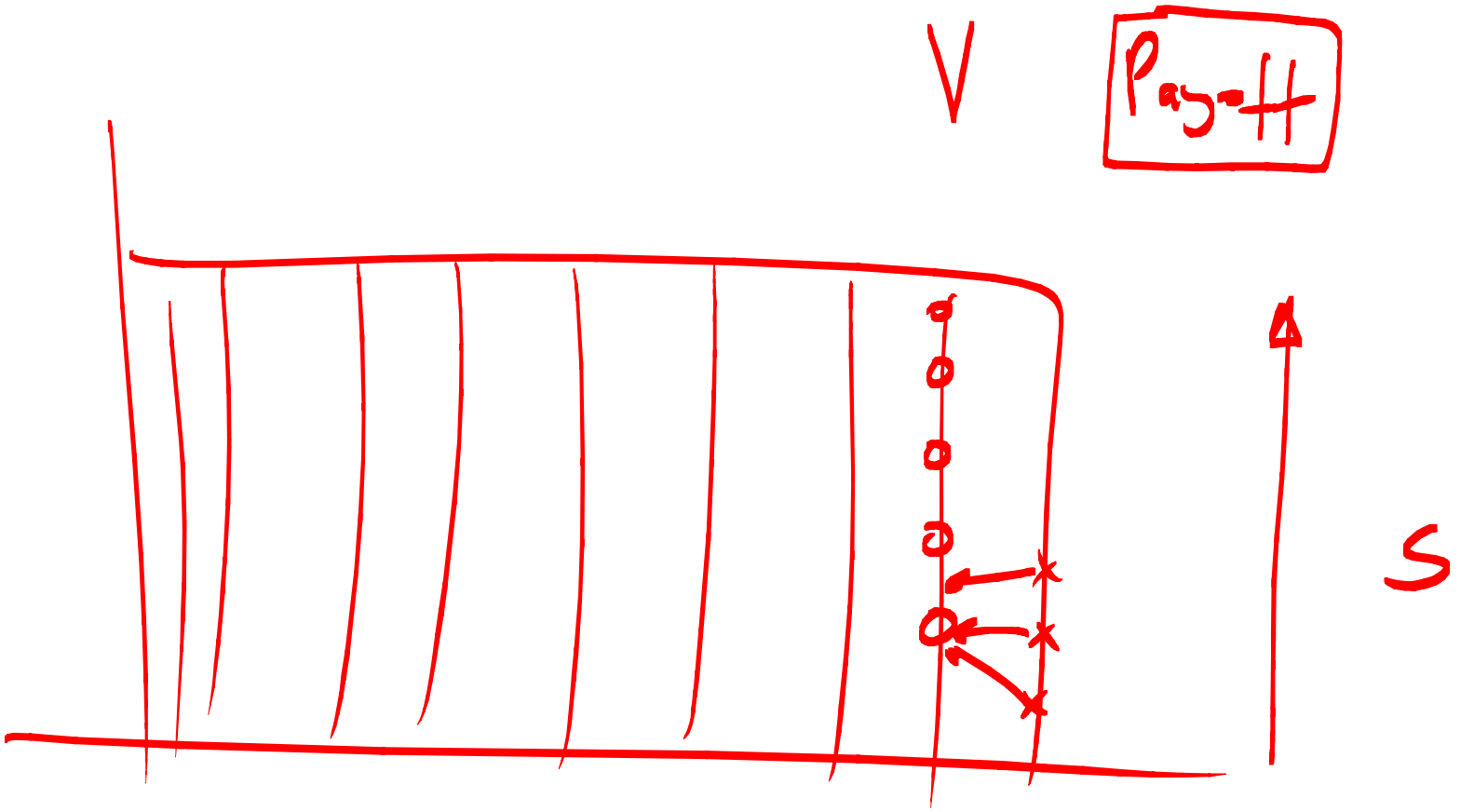
$$\cos 2\theta = c^2 - s^2$$

$$= 2c^2 - 1$$

$$= 1 - 2s^2$$

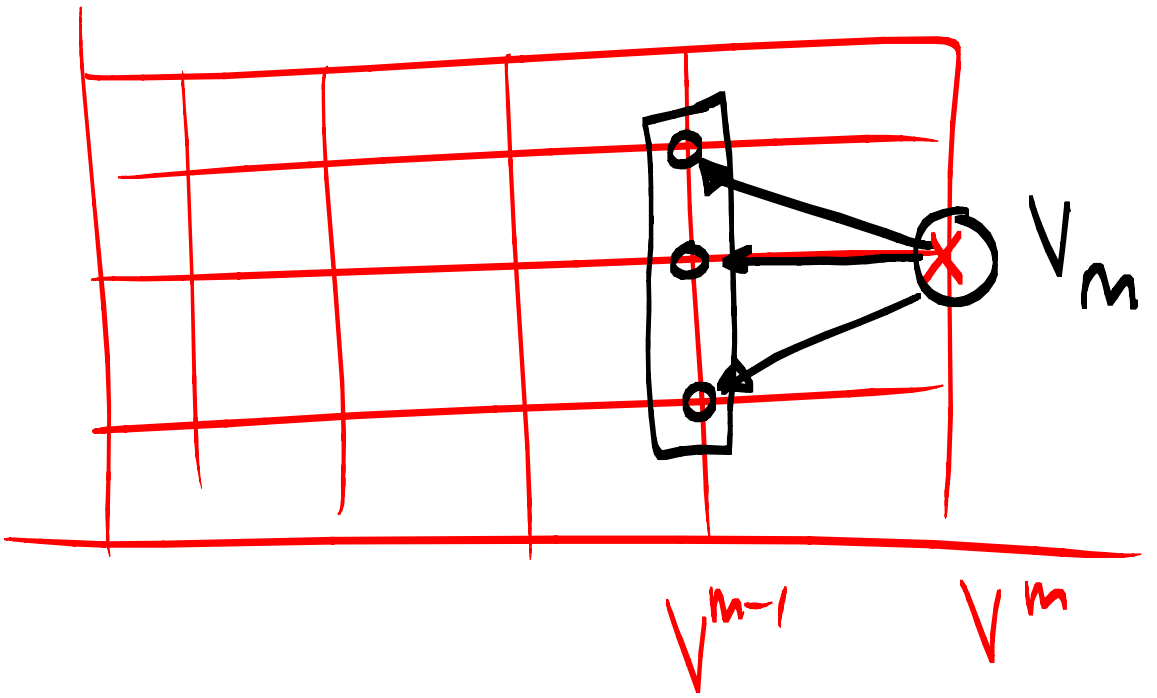
if $\theta = \frac{\omega}{2}$

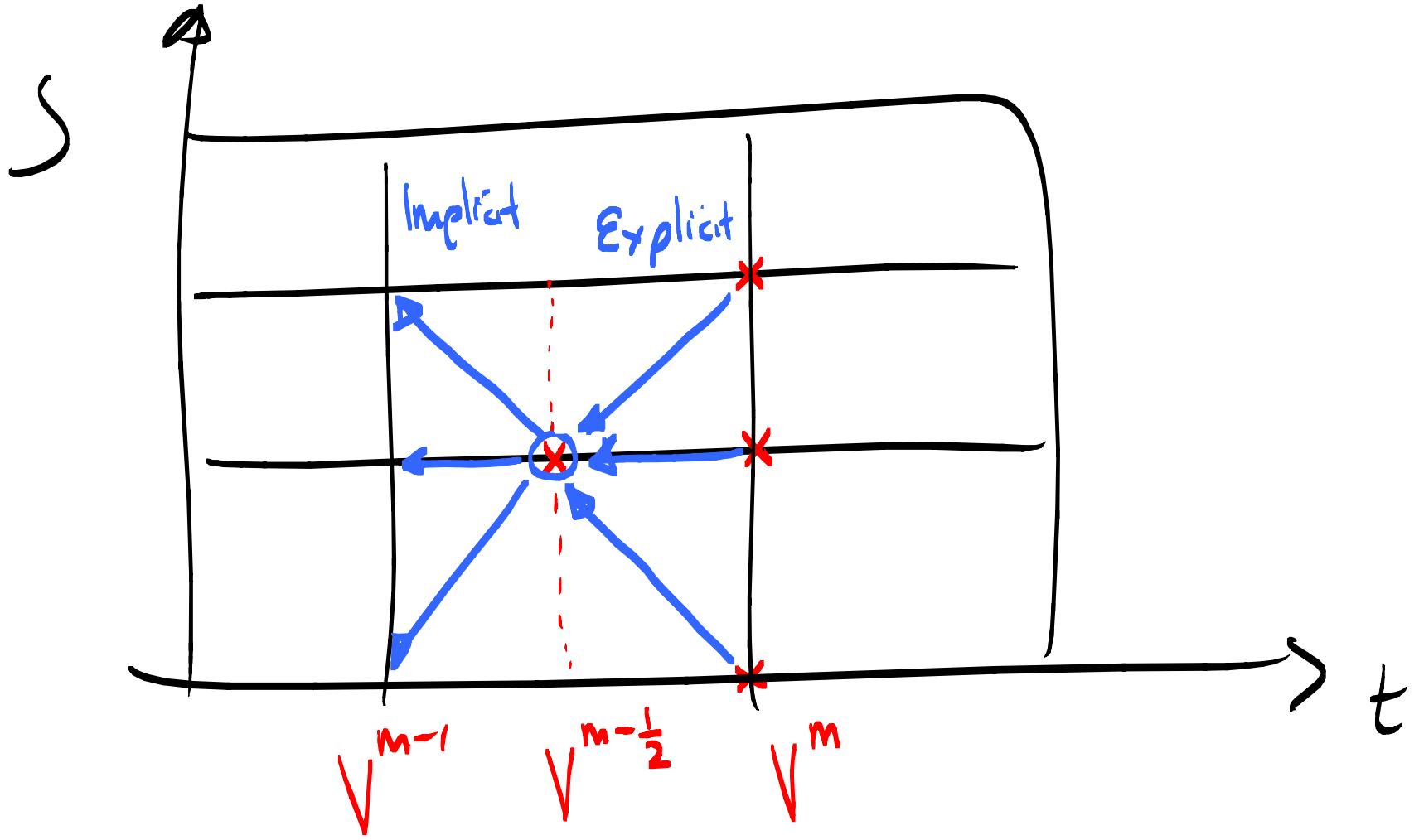
$$\cos\omega = 1 - 2\sin^2\frac{\omega}{2}$$


V
Payoff
S

$y = f(x)$ explicit

$y = f(x, y)$ implicit




S
Implicit
Explicit
t
V^{n-1}
$V^{n-\frac{1}{2}}$
V^{n}

$$\begin{pmatrix} a & b & c \\ d & e & f \\ g & h & i \end{pmatrix}$$

$$|a| > |b| + |c|$$

$$|e| > |d| + |f|$$

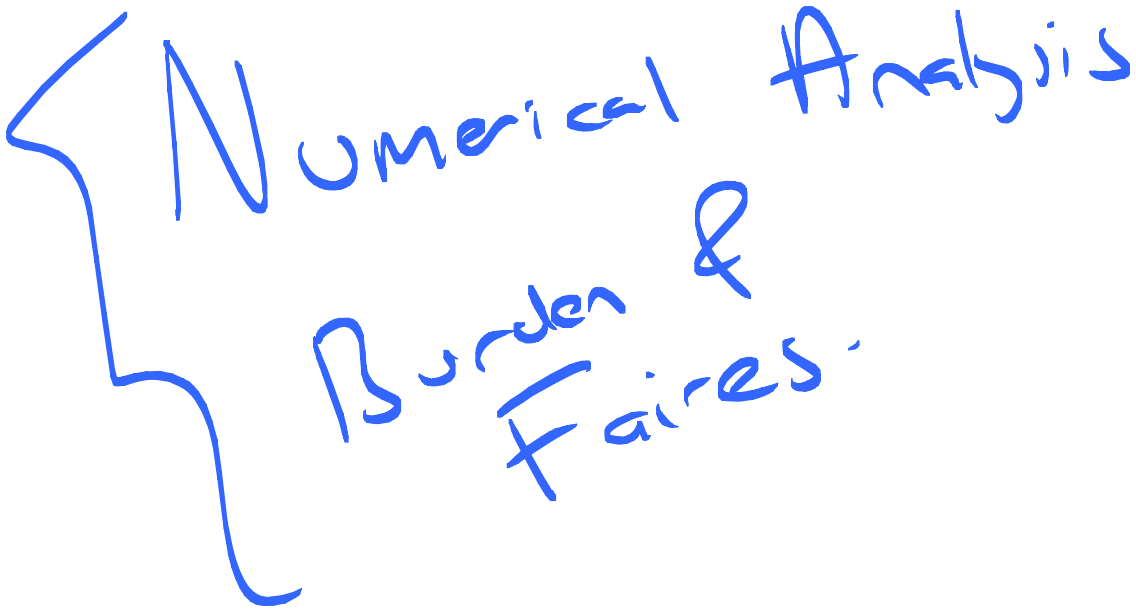
$$i > |g| + |h|$$

S.D.D.

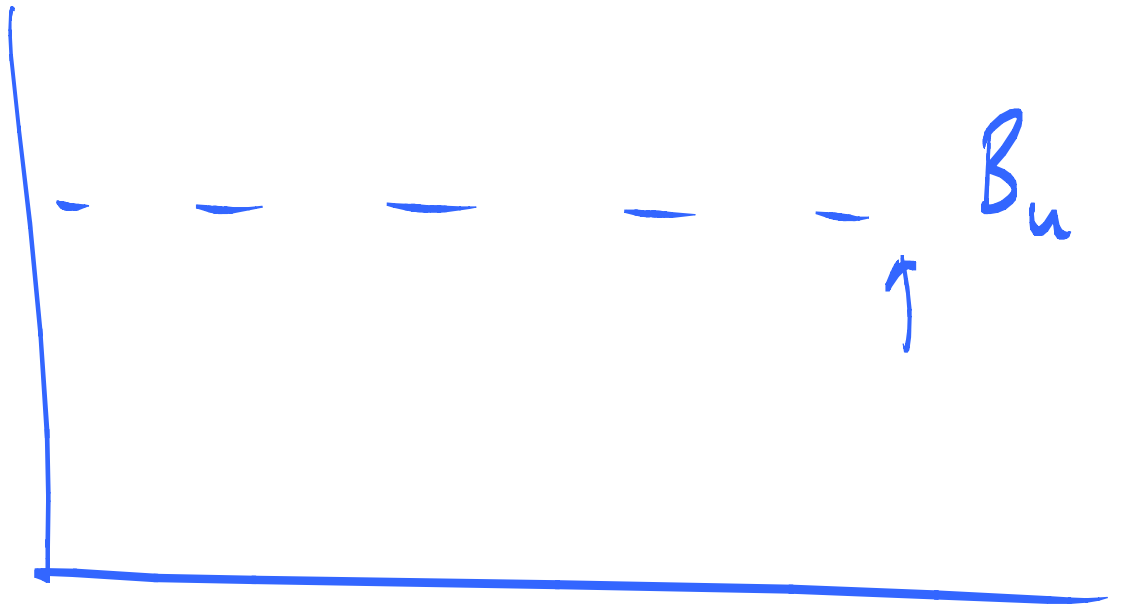
$$A\underline{x} = \underline{b}$$

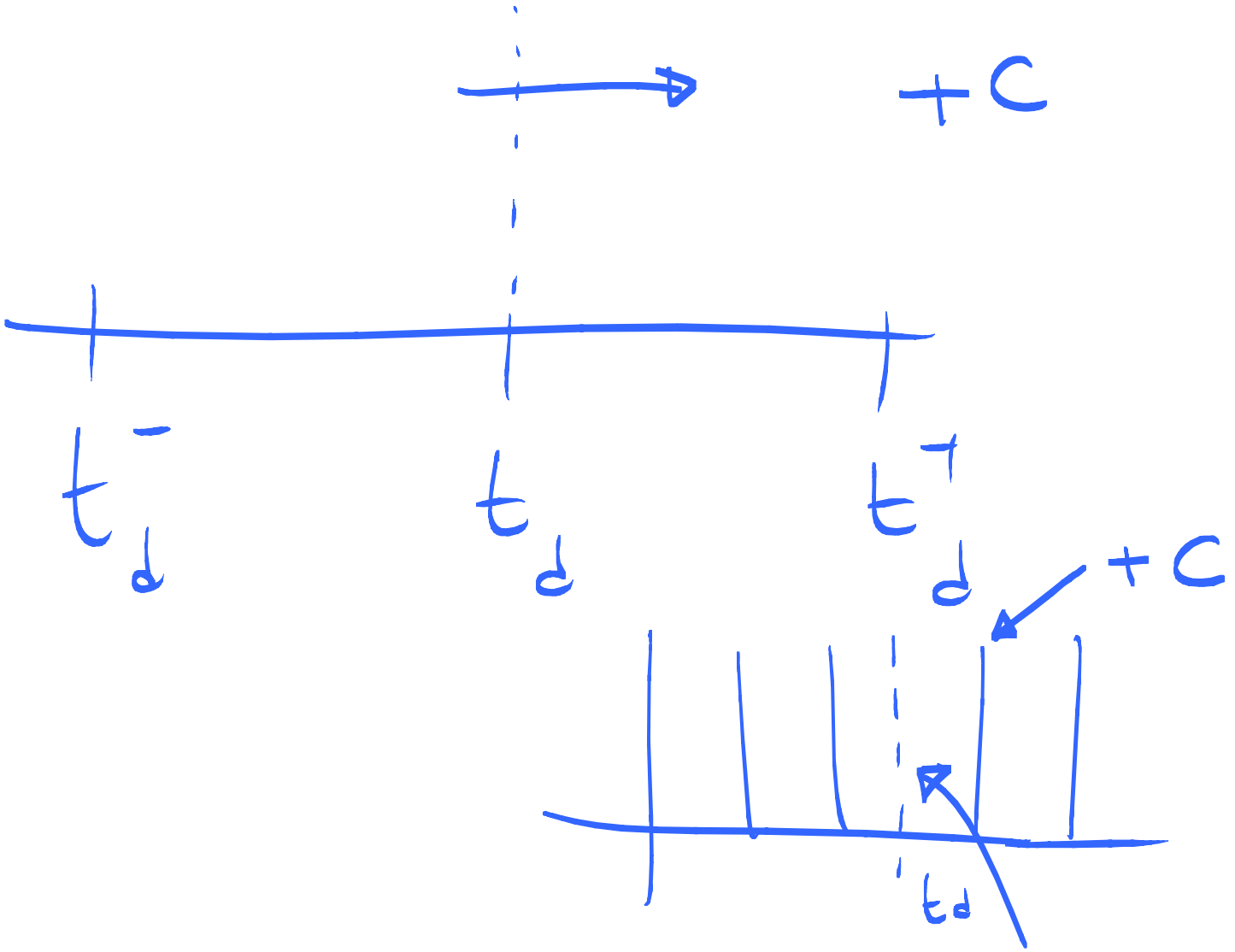
$\underline{x}$ – exact $\quad \underline{b} - A\underline{x} = ?\ 0$

$$\underline{b} - A\underline{x} = \underline{r}$$ residual vector


Numerical Analysis
Burden &
Faires

$V(B_u, t) = 0$




+C
t_d^-
t_d
t_d^+
+C
t_d

$$V = V(S, t)$$

$$I = \int_0^t f(S,\tau)\, d\tau$$

Samplis' va.

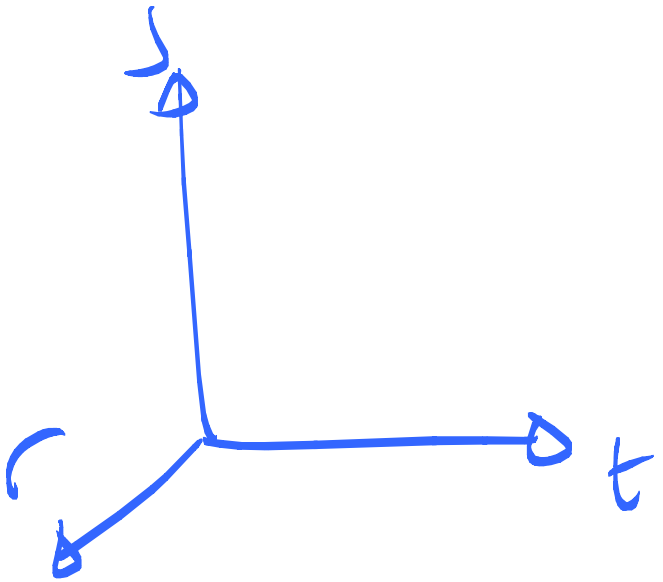
$$dI = f(S,t)\, dt$$

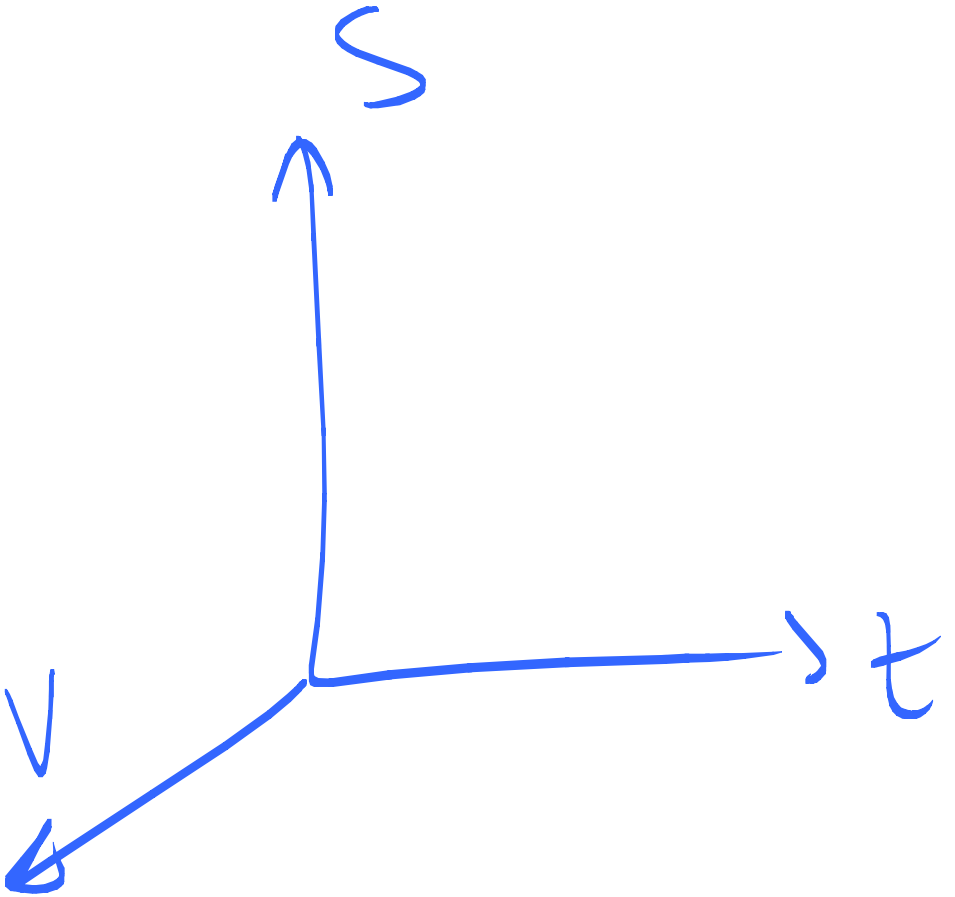
$$\frac{dV}{dI}$$

$$V = V(S, I, t) \qquad dV = dV(S, I, t)$$

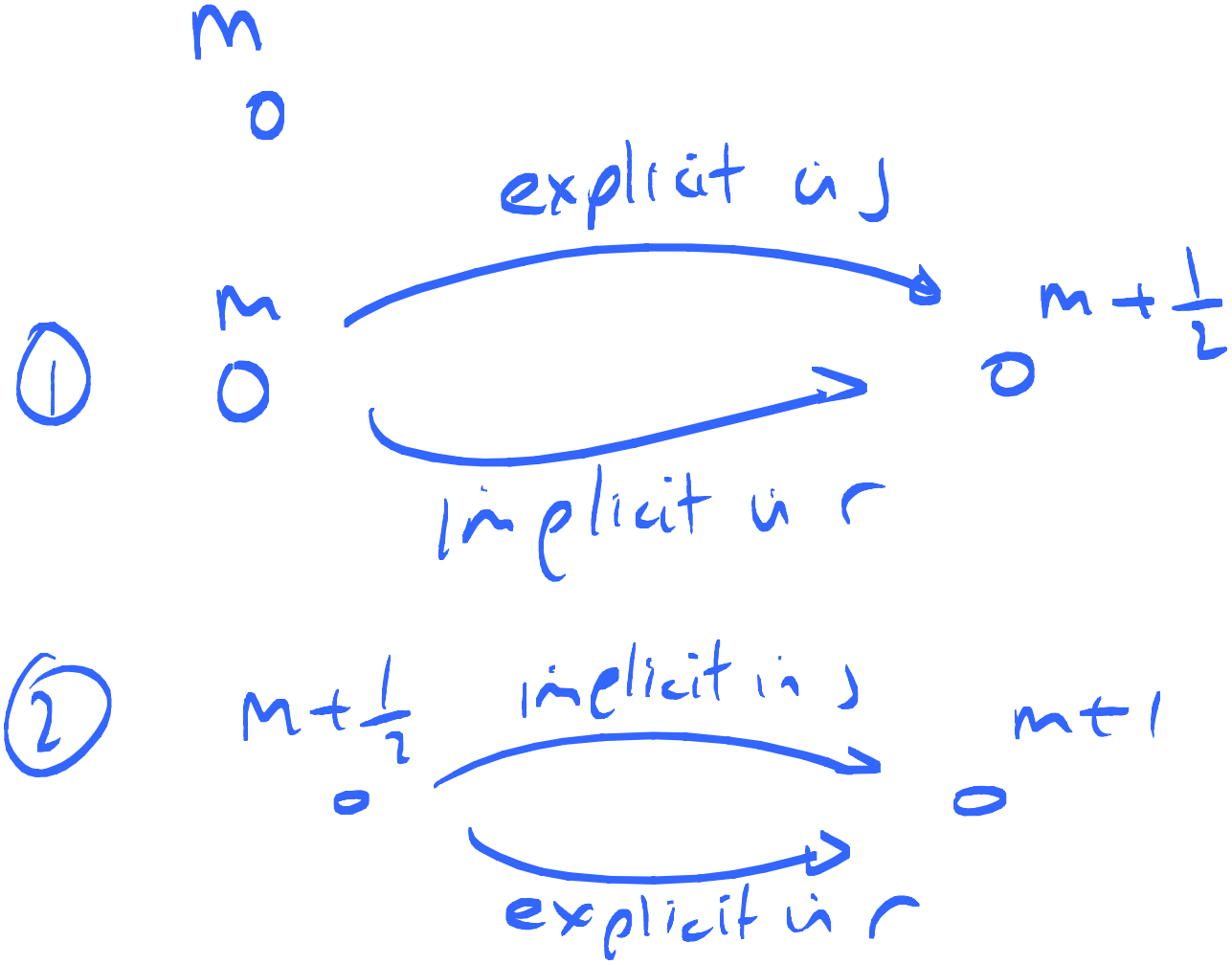
$V(s,t)$

$V(r,s,t)$





A.D.I.



① Ease of explicit

② stability of implicit.