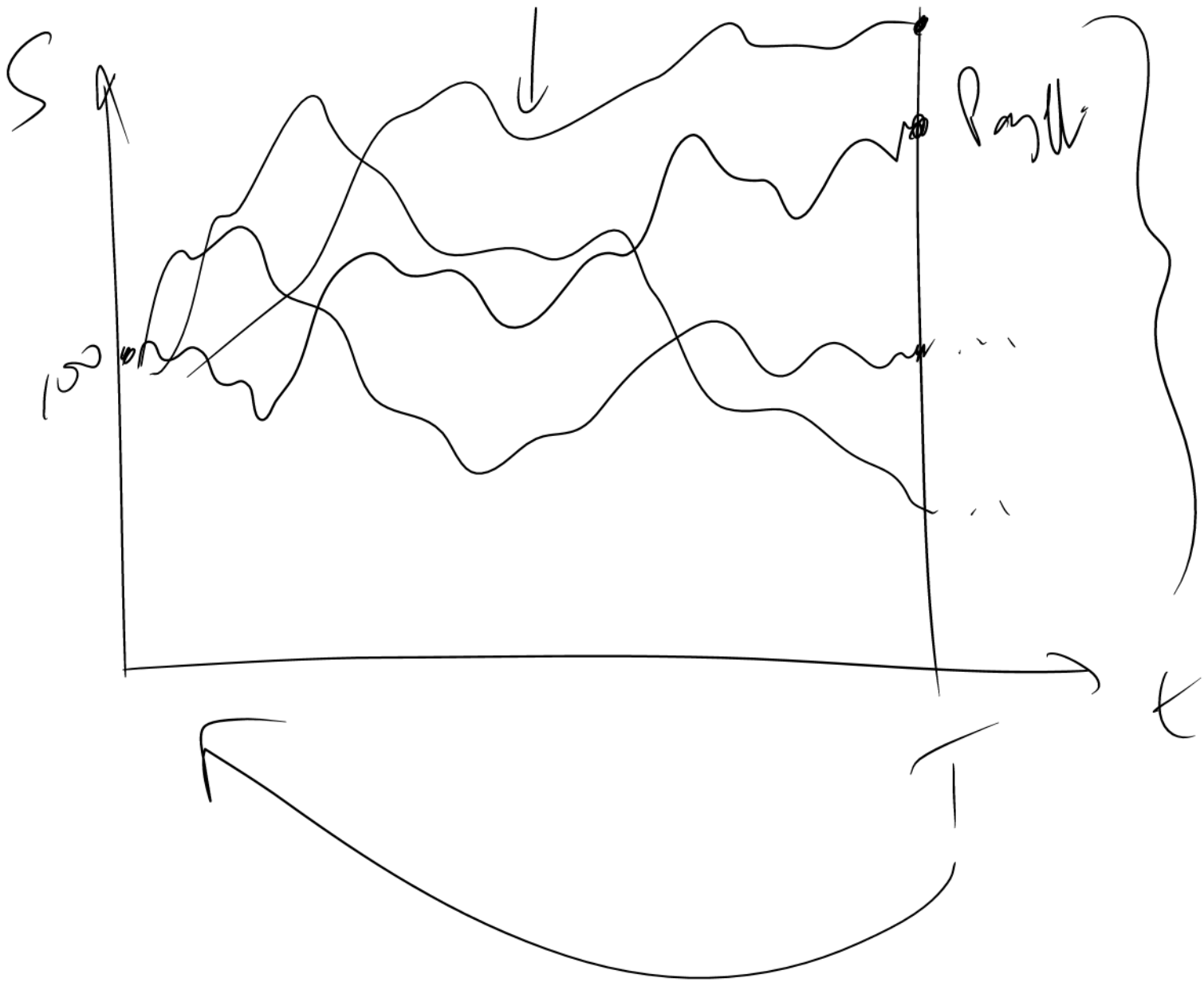
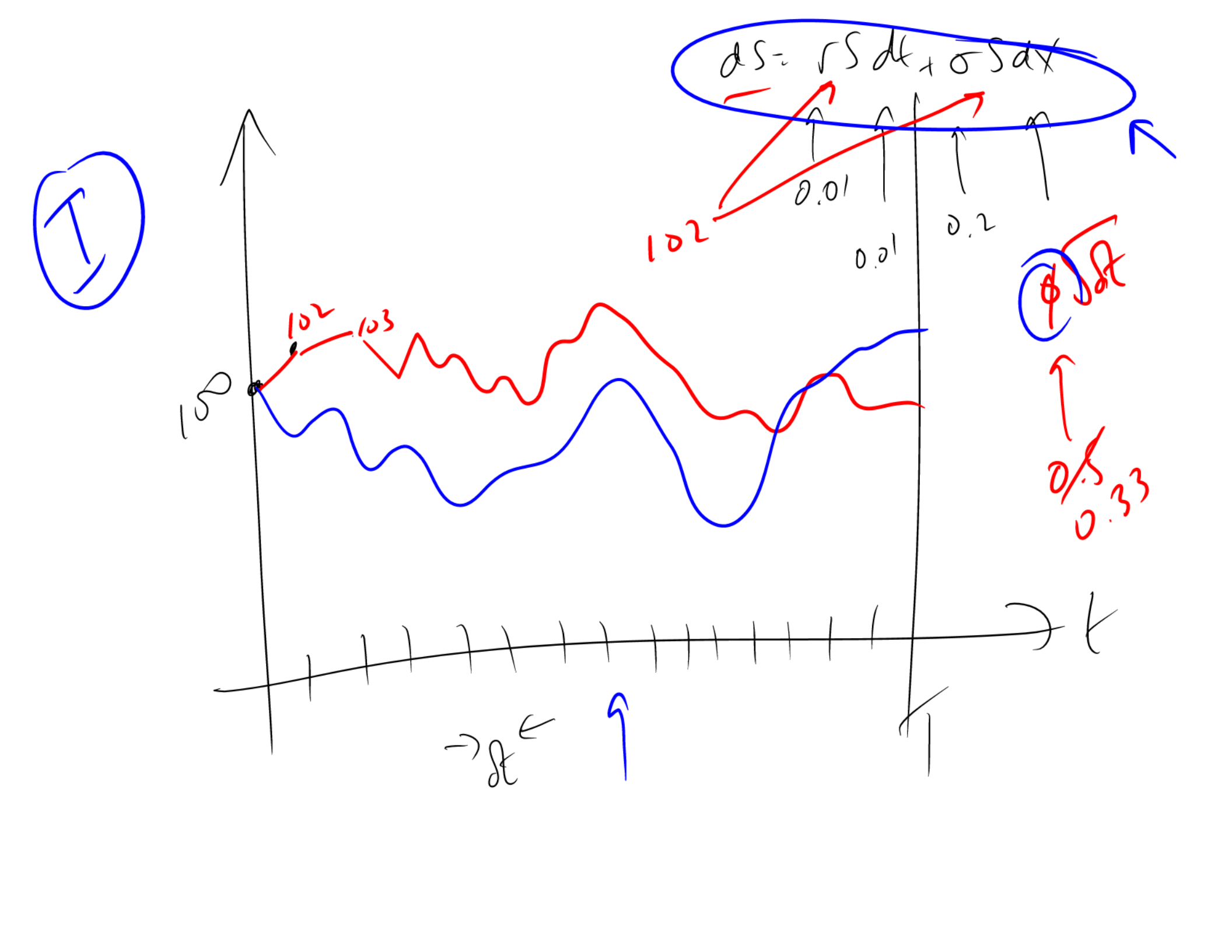
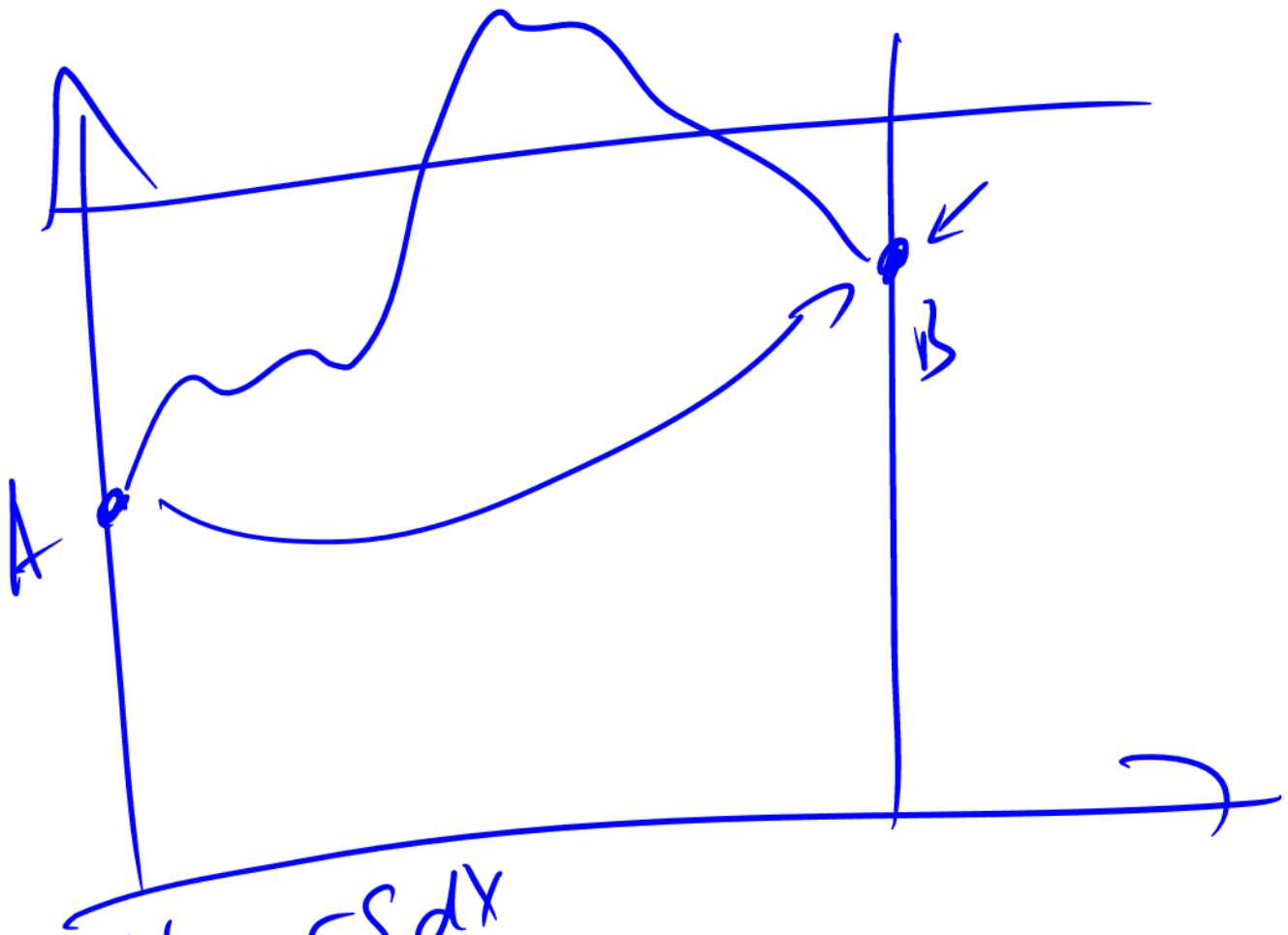

S
100
Payoff
t
T


dS = rS dt + σS dx
102
0.01
0.01
0.2
φ δt
0.5
0.33
T
100
102
103
t
δt

11



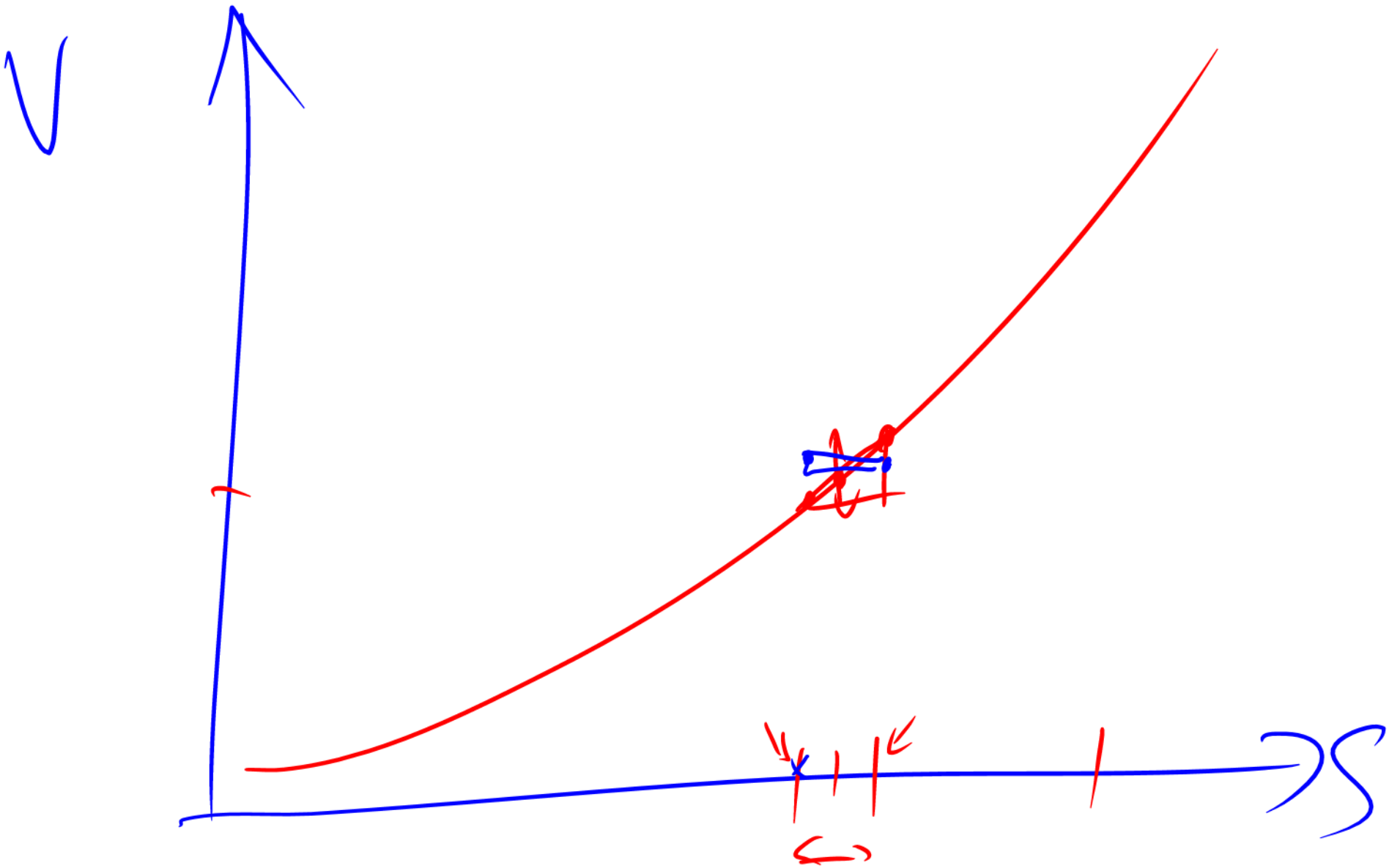
$* \quad dS = rS\,dt + \sigma S\,dX$

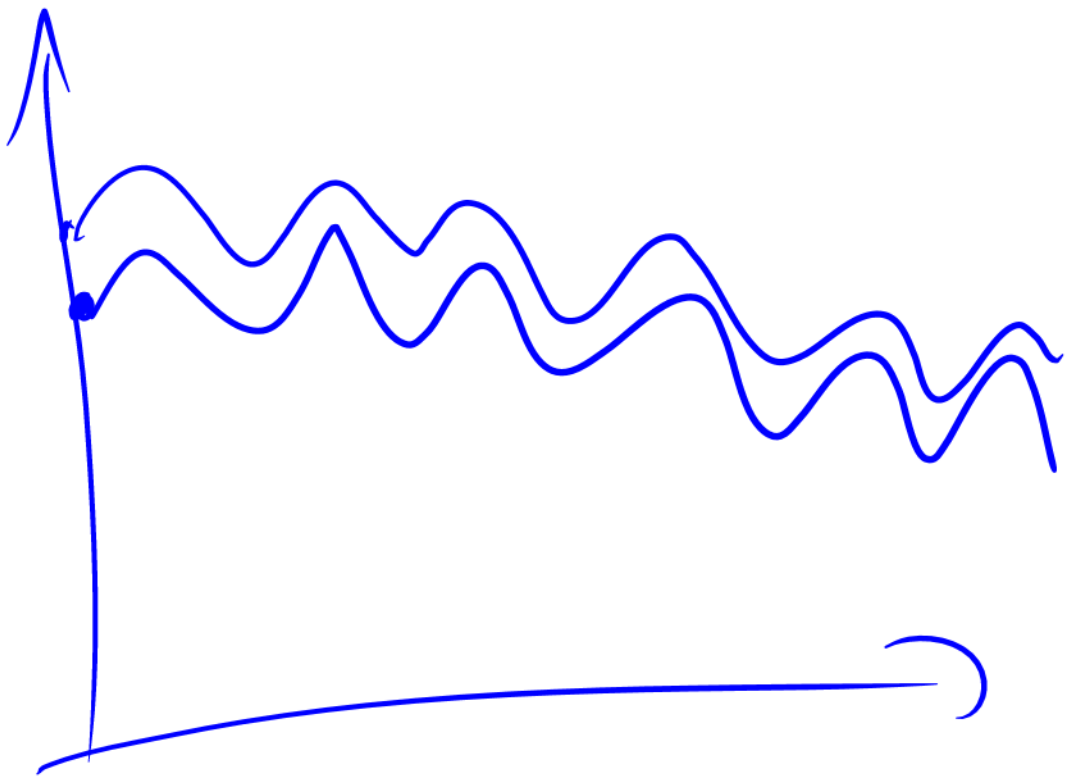
$d(\ln S) = \left(r - \frac{\sigma^2}{2}\right)dt + \sigma\,dX$

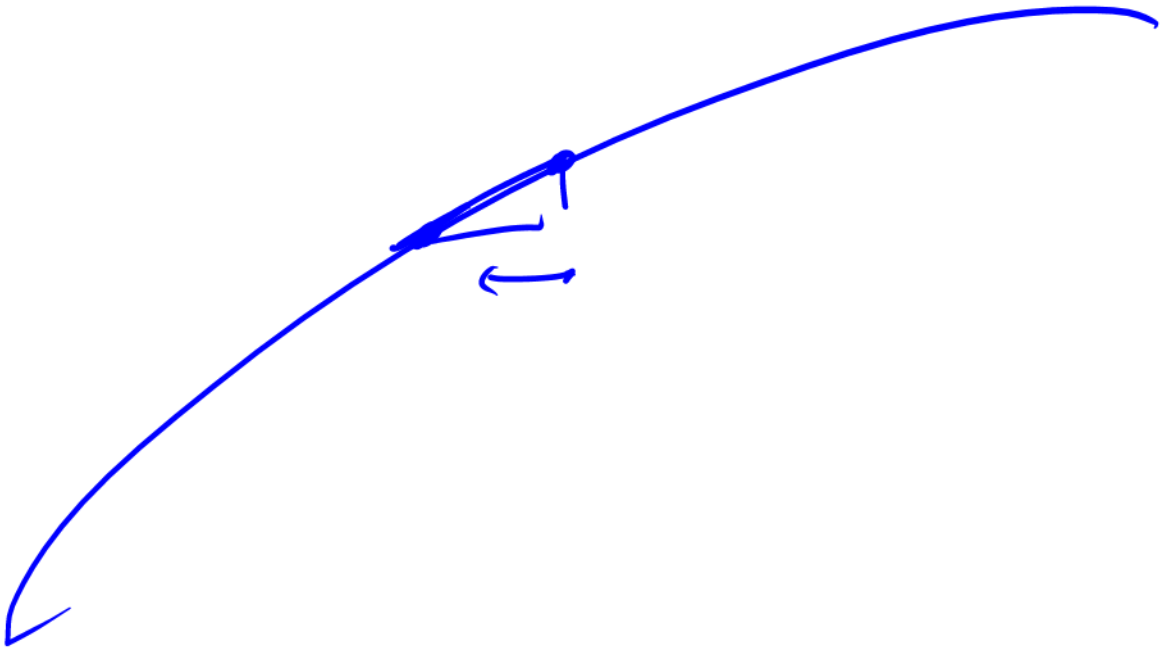
$\ln S = \cdots * \left(r - \frac{\sigma^2}{2}\right)t + \cdots$

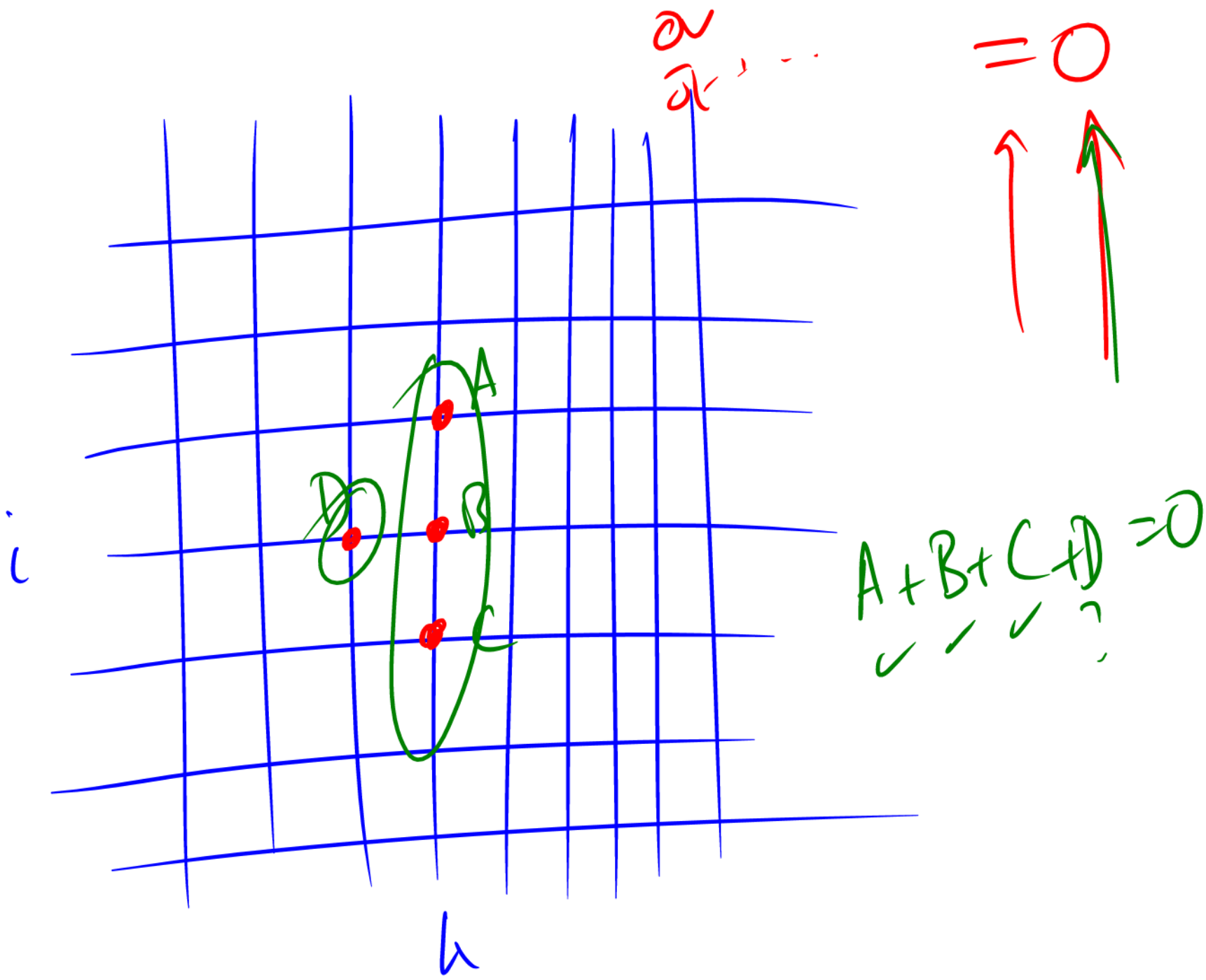
$$\delta S = r S \delta t + \sigma S \sqrt{\delta t}\, \phi$$

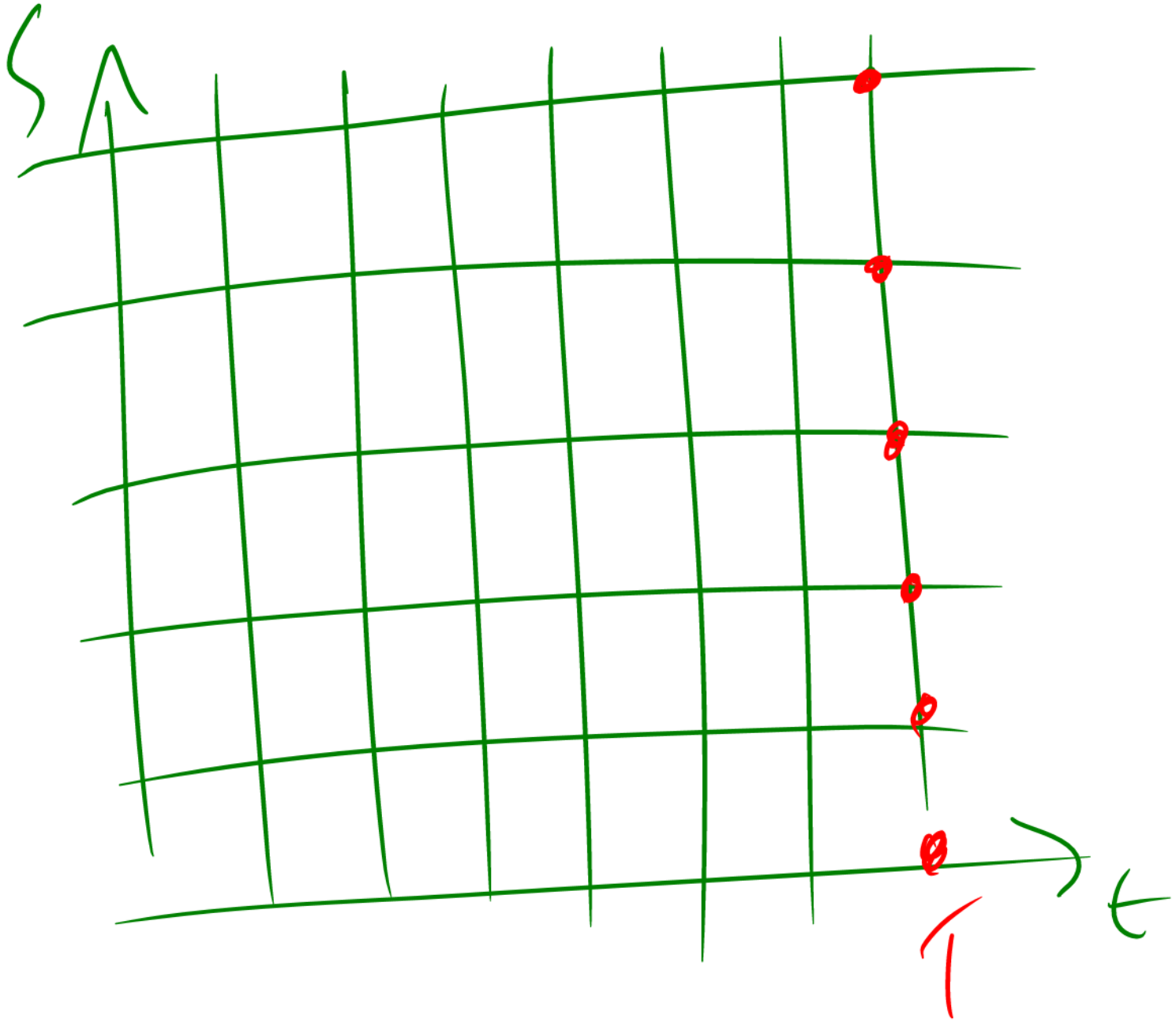
$$\underbrace{S + \delta S}_{\text{new}} = S\left(1 + r\delta t + \sigma\sqrt{\delta t}\,\phi\right)$$

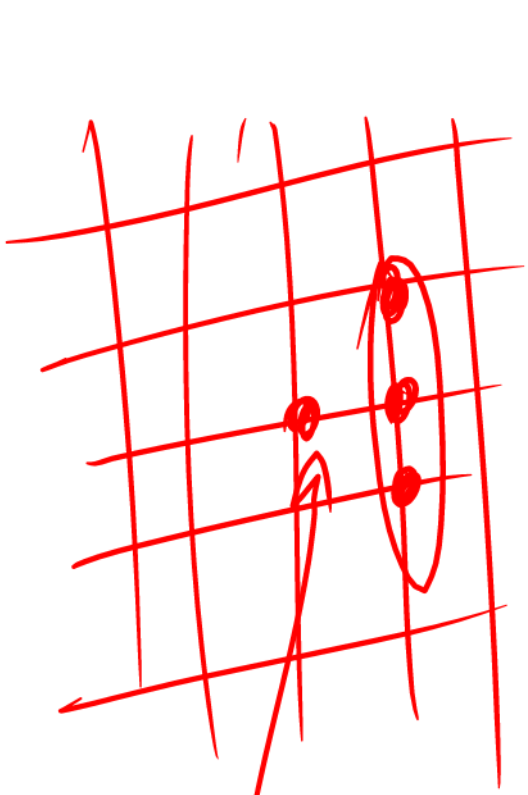

V
S



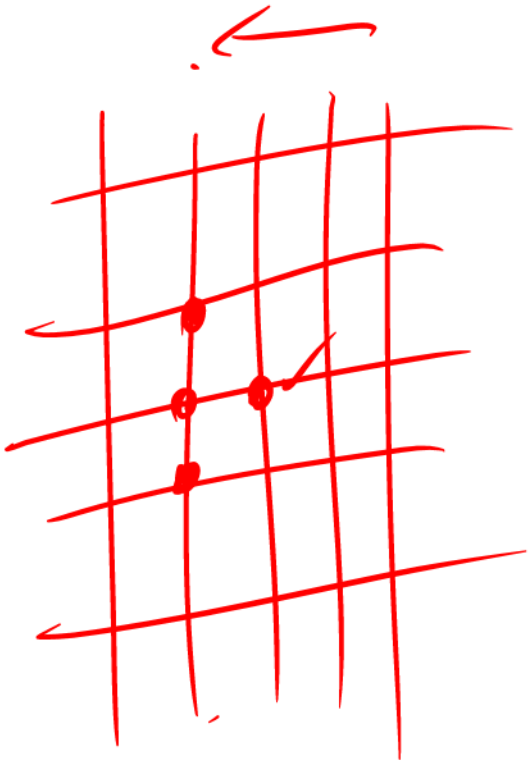



∂
∂x , . .
= 0
A
B
C
D
i
k
A + B + C + D = 0


S
t
T

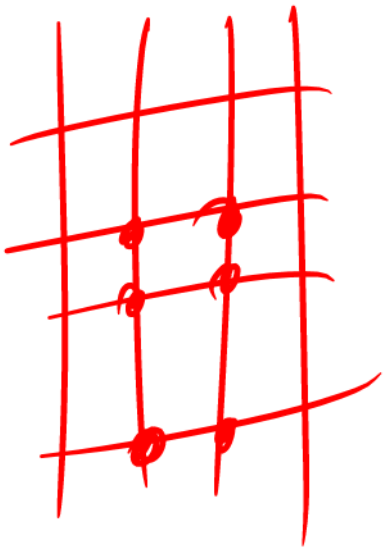


Explicit



Implicit

Matrix



Crank-
Nicolson.

$$\frac{\partial V}{\partial t} = \theta = \frac{V_i^k - V_i^{k+1}}{\Delta t}$$

$$V_i^{k+1} = V_i^k - \theta \Delta t .$$

V_{New} V_{old}