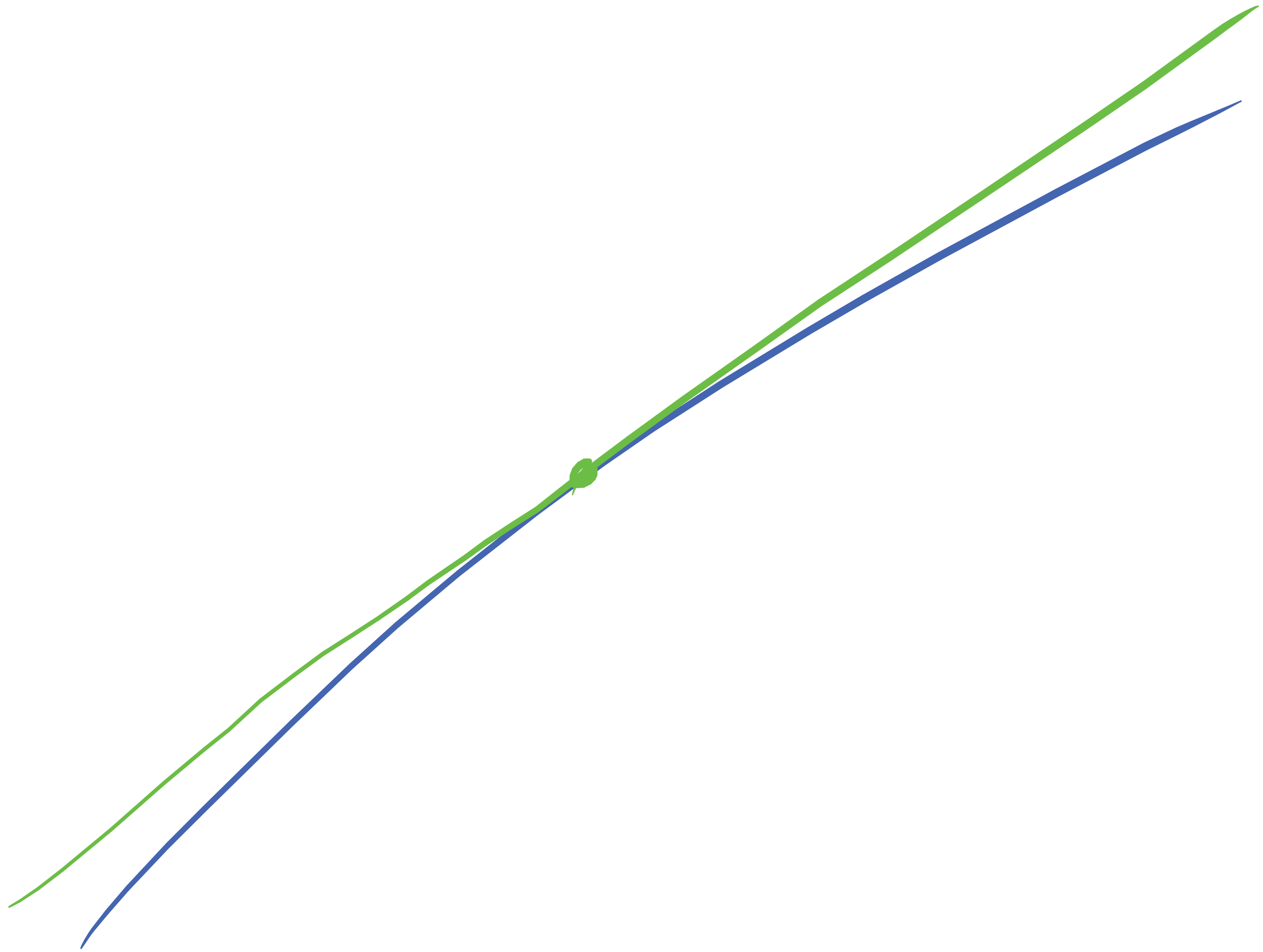


$* \; f(x+h) = a + bh + ch^2 + dh^3 + eh^4 + \dots$

1. Put $h=0$.

$$f(x) = a + 0 + 0 + \dots = a$$

$$\boxed{a = f(x)}$$

2. Diff $*$ w.r.t. h:

$$\frac{df(x+h)}{dx} = \frac{d}{dh} f(x+h) = 0 + b + 2ch + 3dh^2 + 4eh^3 + \dots \qquad \ast\ast$$

Set $h=0$: $\dfrac{df(x)}{dx} = b + 0 + 0 + \dots$

$$\boxed{b = \frac{df(x)}{dx}}$$

3

put $h = 0$

$$\frac{d^2 f}{dh^2}(x+h) = 0 + 2c + 3.2.dh + 4.3.eh^2 + \dots$$

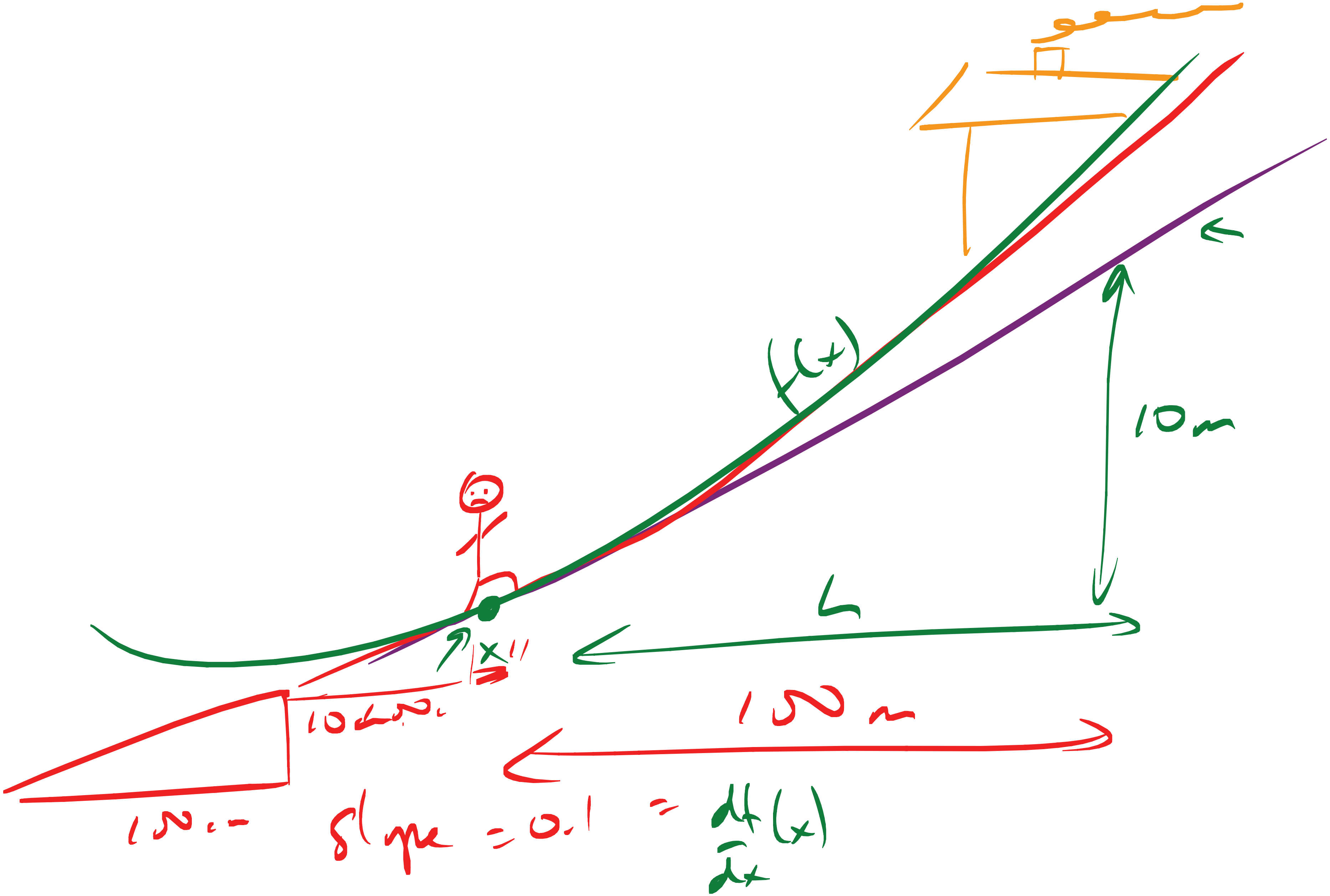
$$\frac{d^2 f}{dx^2}(x) = 2c$$

$$\boxed{c = \frac{1}{2}\frac{d^2 f}{dx^2}(x)}$$

4. Diff wrt h, set $h = 0$ . . .

$$d = \frac{1}{3!}\frac{d^3 f}{dx^3}(x)$$

$$e = \frac{1}{4!}\frac{d^4}{dx^4}f(x)$$



f(x)
10m
L
100m
10cm
slope = 0.1 = df(x)/dx

$$\delta S = S_{i+1} - S_i = \mu S_i \,\delta t + \sigma S_i \,\phi \,\underline{\underline{\sqrt{\delta t}}}$$

$$V(S+\underline{\delta S},\, t+\underline{\delta t}) \simeq \underline{V(S,t)}$$

$$+ \frac{\partial V}{\partial t}(S,t)\cdot\underline{\delta t} + \frac{\partial V}{\partial S}(S,t)\cdot\underline{\delta S} = O(\sqrt{\delta t})$$

$$+ \frac{1}{2}\frac{\partial^2 V}{\partial S^2}\underbrace{(\delta S)^2}_{O(\delta t)} + \cancel{\frac{1}{2}\frac{\partial^2 V}{\partial t^2}(\delta t)^2} + \cancel{\frac{\partial^2 V}{\partial S\,\partial t}\cdot\delta S\cdot\delta t}\ O(\delta t^{3/2})$$

$$+ \cancel{\frac{1}{3!}\frac{\partial^3 V}{\partial S^3}(\delta S)^3} + \cdots + o(\delta t)$$

$$O(\delta t^{3/2})$$

$$\left(\omega + O(\delta t^{3/2})\right)$$

if RAND() < α $\rightarrow$ $+\delta y$

if RAND() > $1-\alpha$ $-\delta y$

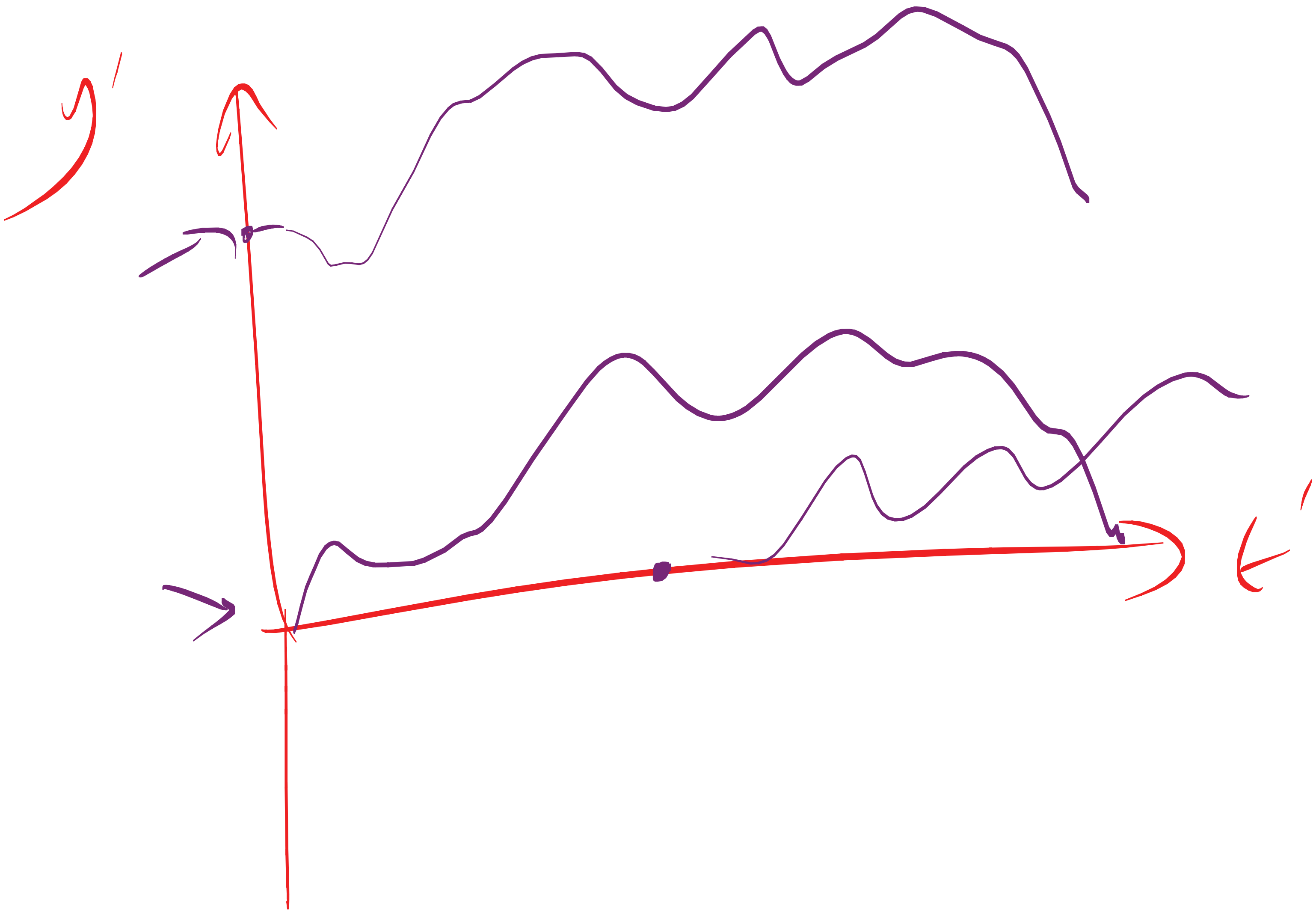
else 0

$$p(\underline{y, t} ; \underline{y', t'})$$

backward

forward

$$t' > t$$



y'
x'

$$c^2 = \alpha \frac{\delta y^2}{\delta t}$$

$$\frac{\partial p}{\partial t'} = c^2 \frac{\partial^2 p}{\partial y'^2}$$

1. $\frac{\partial p}{\partial t'} = 0$

2. $\frac{\partial^2 p}{\partial y'^2} = 0$

3. $\frac{\partial p}{\partial t'} = c^2 \frac{\partial^2 p}{\partial y'^2}$

1) $\delta y = \delta t$

$c^2 = \alpha \frac{\delta y^2}{\delta t} = \alpha \, \delta t$

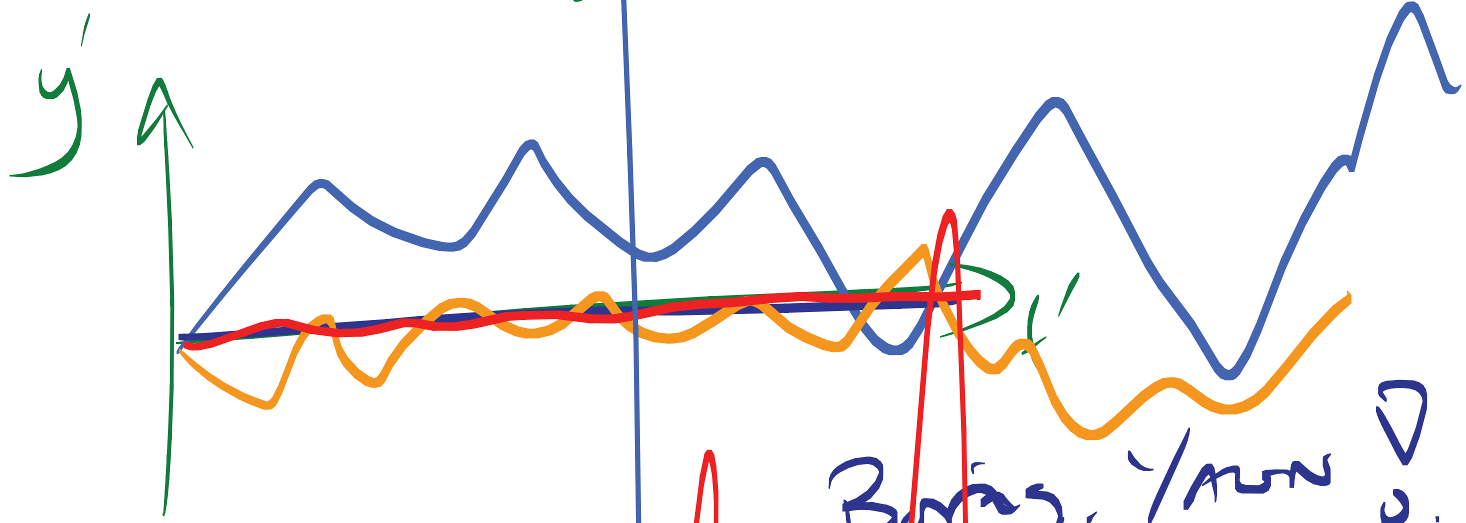
$c \to 0$

2) $c \to \infty$

3) $\delta y = O(\sqrt{\delta t})$

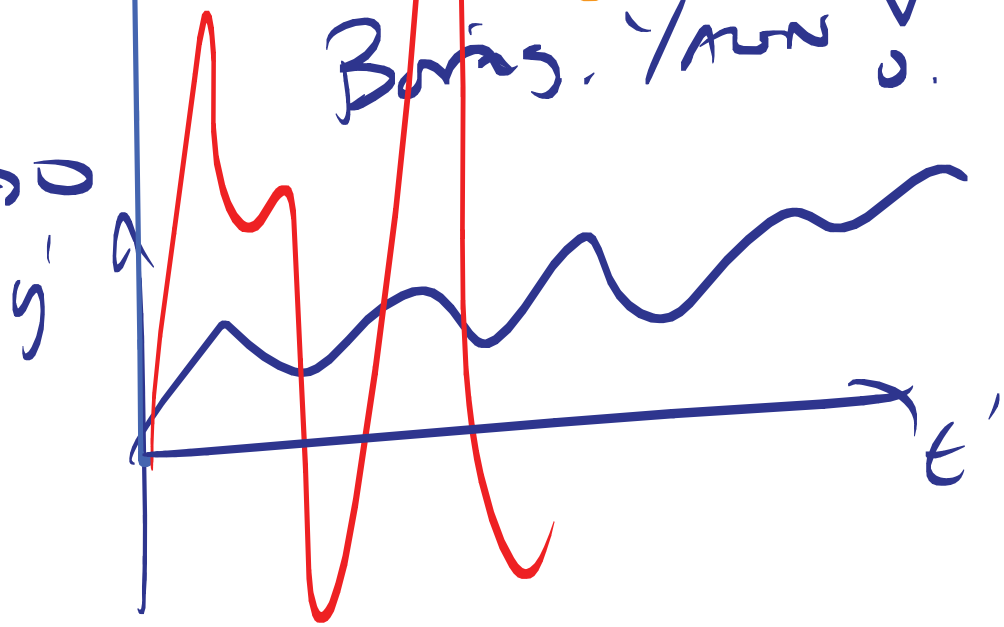
$c^2 = \text{fin}$

1. $c \to 0$. $\delta y \to 0$ fil, $\delta t \to 0$.



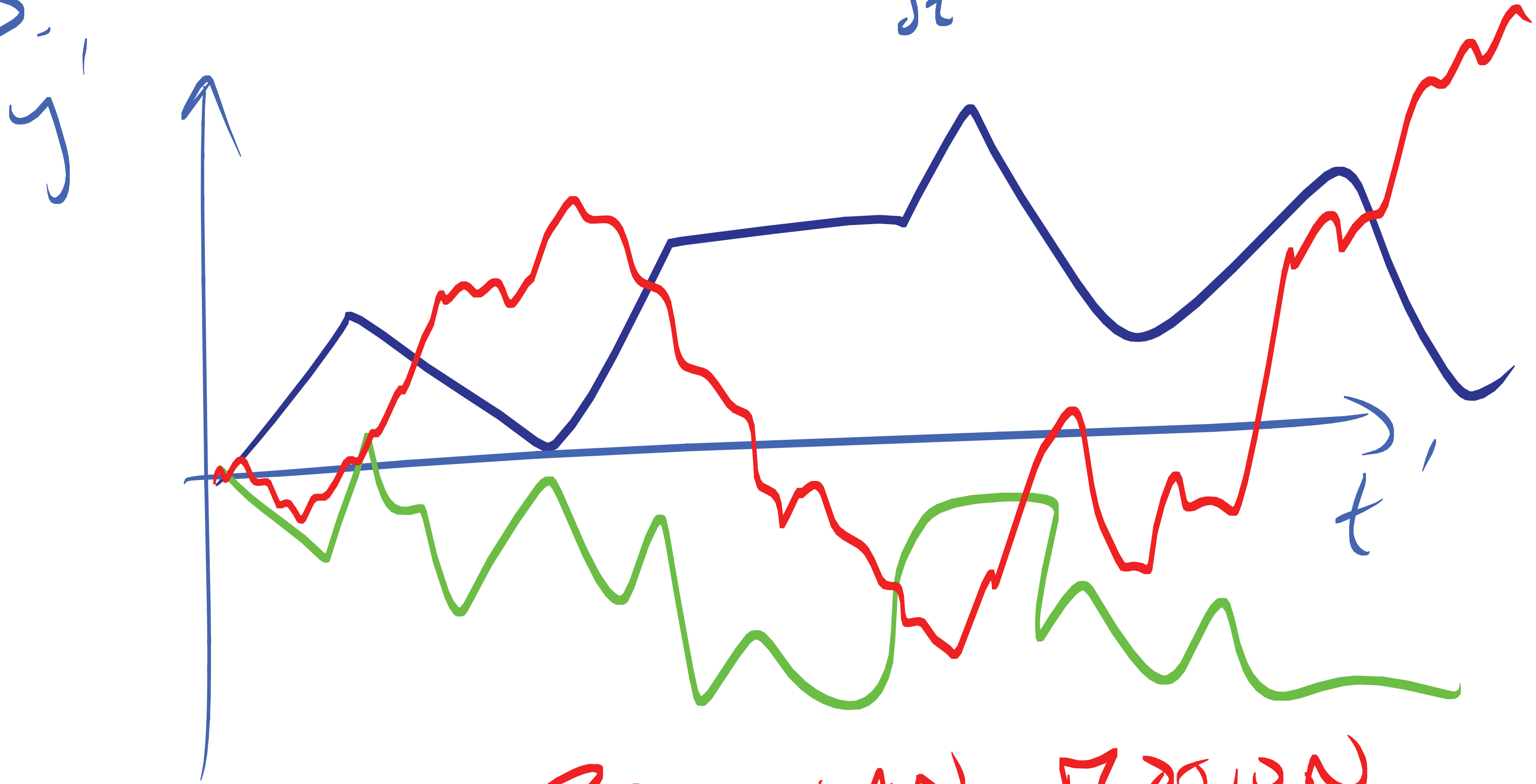
Boring. Yawn!

2. $c \to \infty$. $\Omega \to 0$



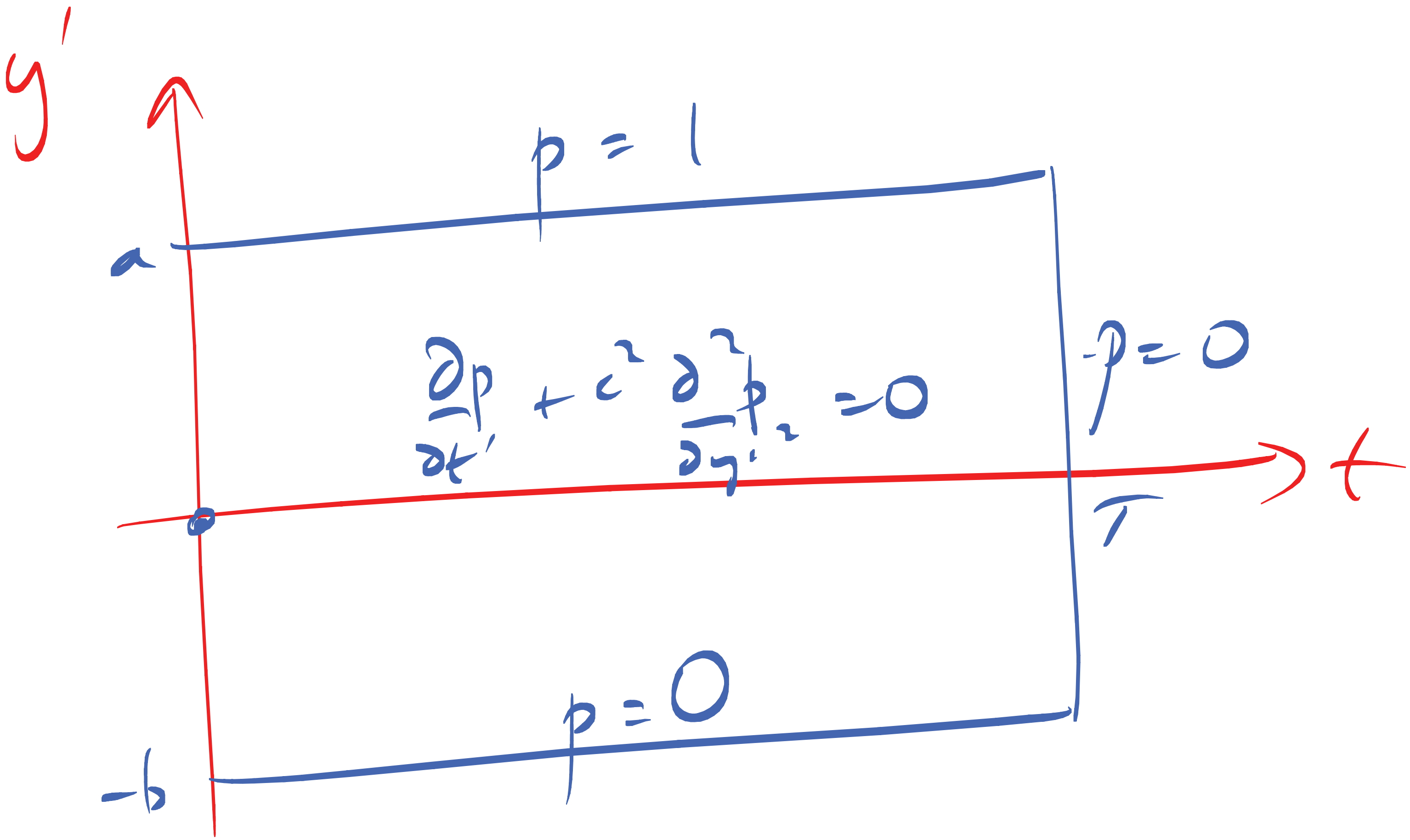
3. Distinguished line

$$\frac{\delta y}{\delta t} = fn$$

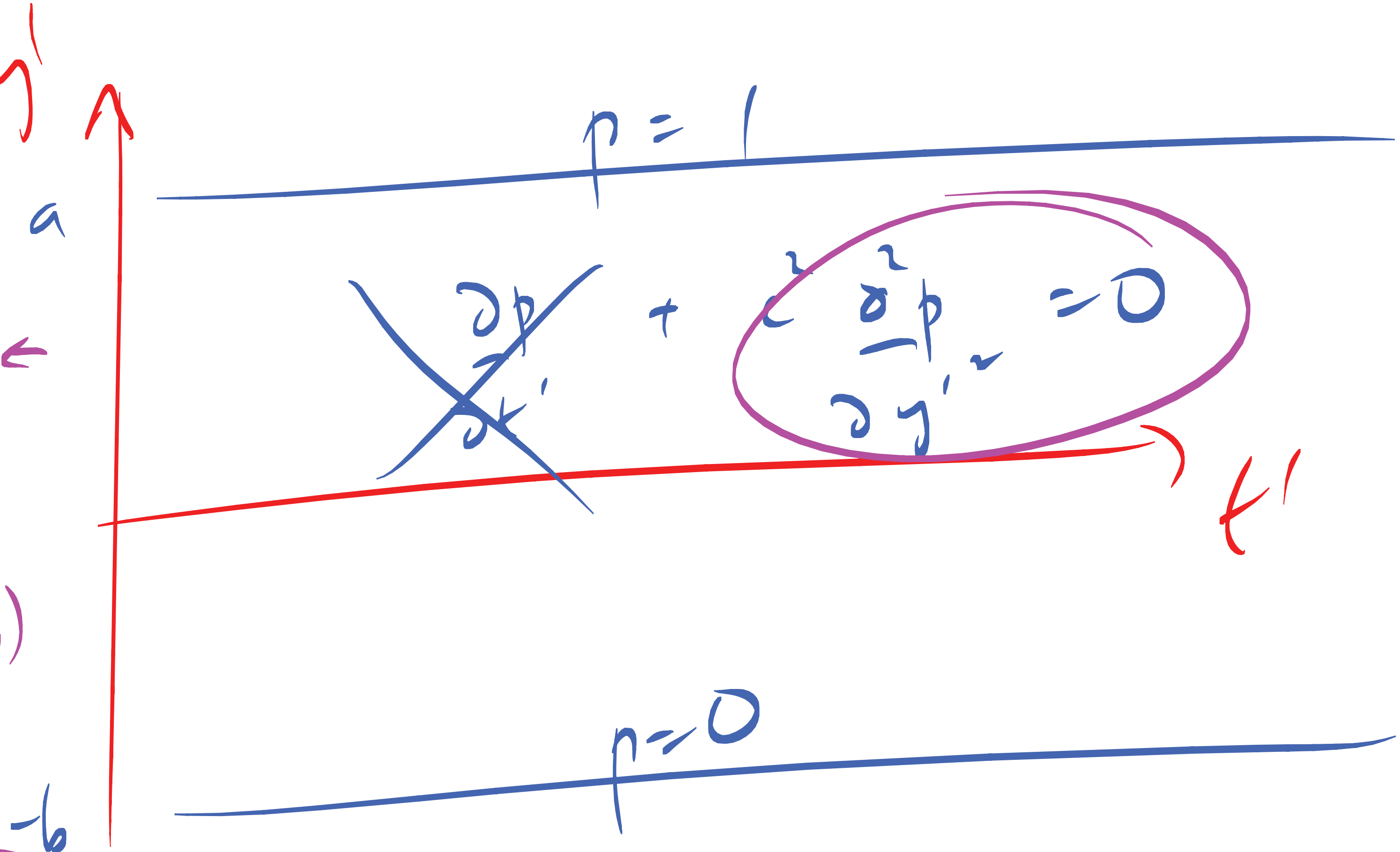


BROWNIAN MOTION

$$\delta y = O\left(\sqrt{\delta t}\right)$$



y'
$p = 1$
a
$\frac{\partial p}{\partial t'} + c^2 \frac{\partial^2 p}{\partial y'^2} = 0$
$p = 0$
t
0
T
$p = 0$
$-b$



$$\cancel{\frac{\partial p}{\partial t'}} + c^2 \frac{\partial^2 p}{\partial y'^2} = 0$$

$$p = \alpha + \beta y'$$

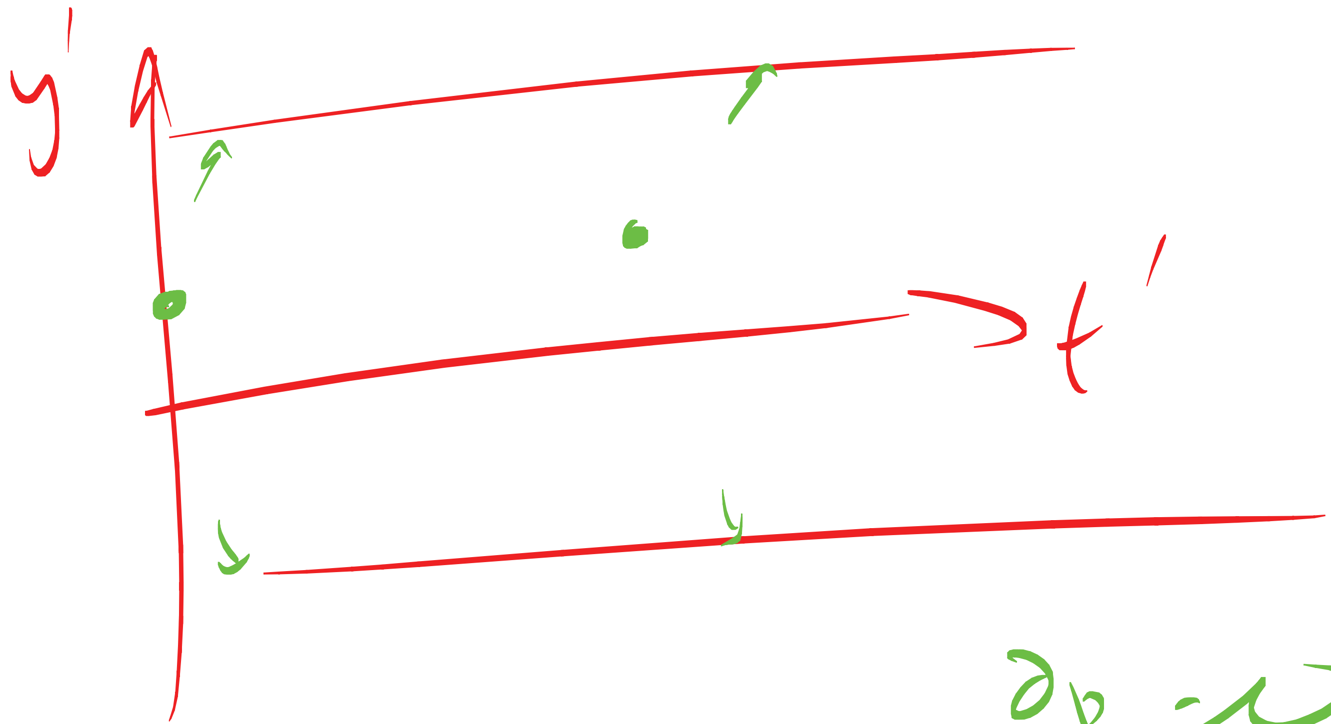
$$p = \beta(y' + b)$$

$$1 = \beta(\alpha + b)$$

$$\beta = \frac{1}{\alpha + b}$$

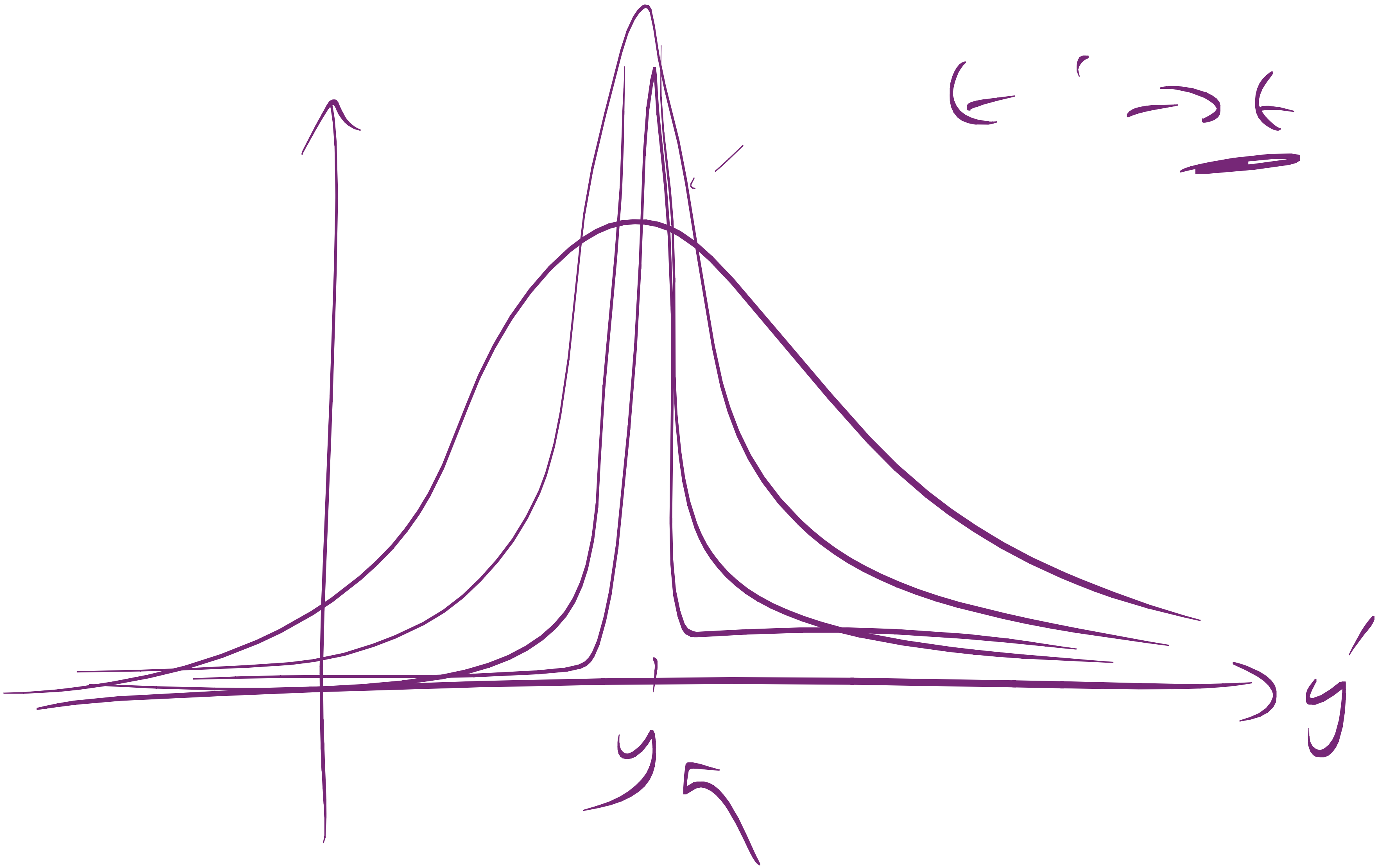
$$p = \frac{y' + b}{a + b}$$

$$\frac{b}{a + b}$$

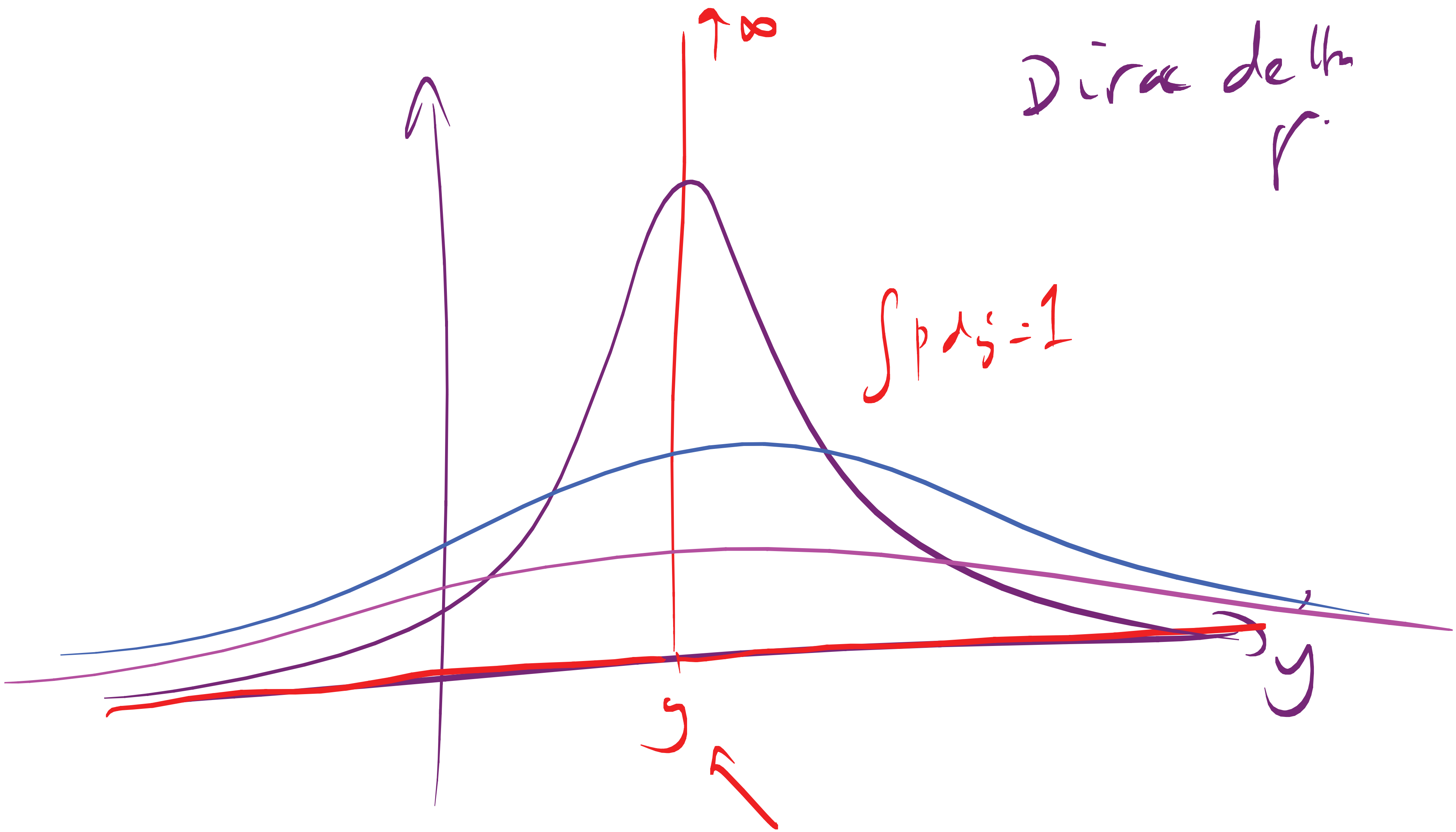


$$\frac{\partial p}{\partial t'} = 0$$

"steady-state soln"

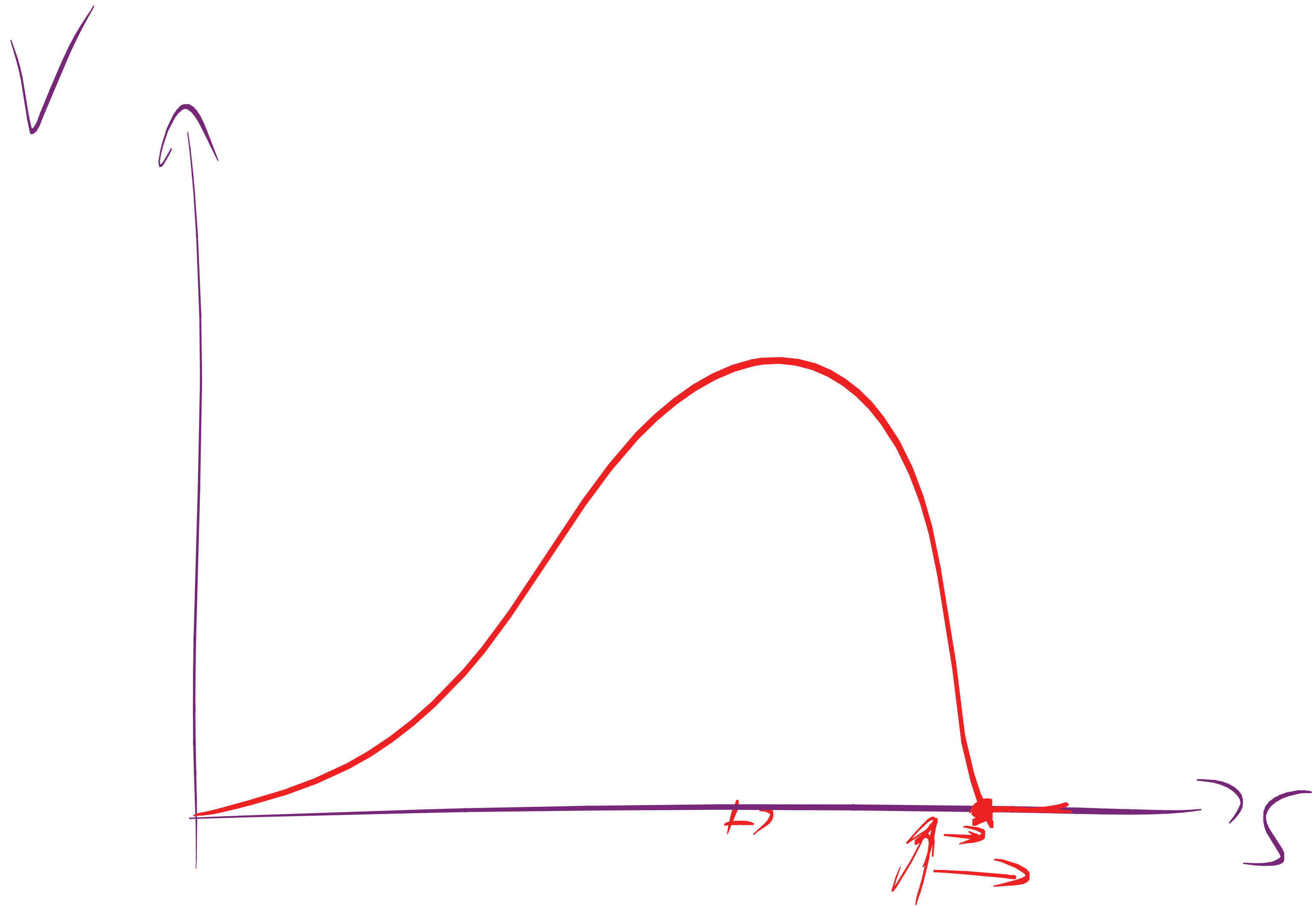


$\epsilon' \to \epsilon$
y_n
y'



Dirac delta
$\uparrow\infty$
$\int p\,dy = 1$
y


y
y'


V
s