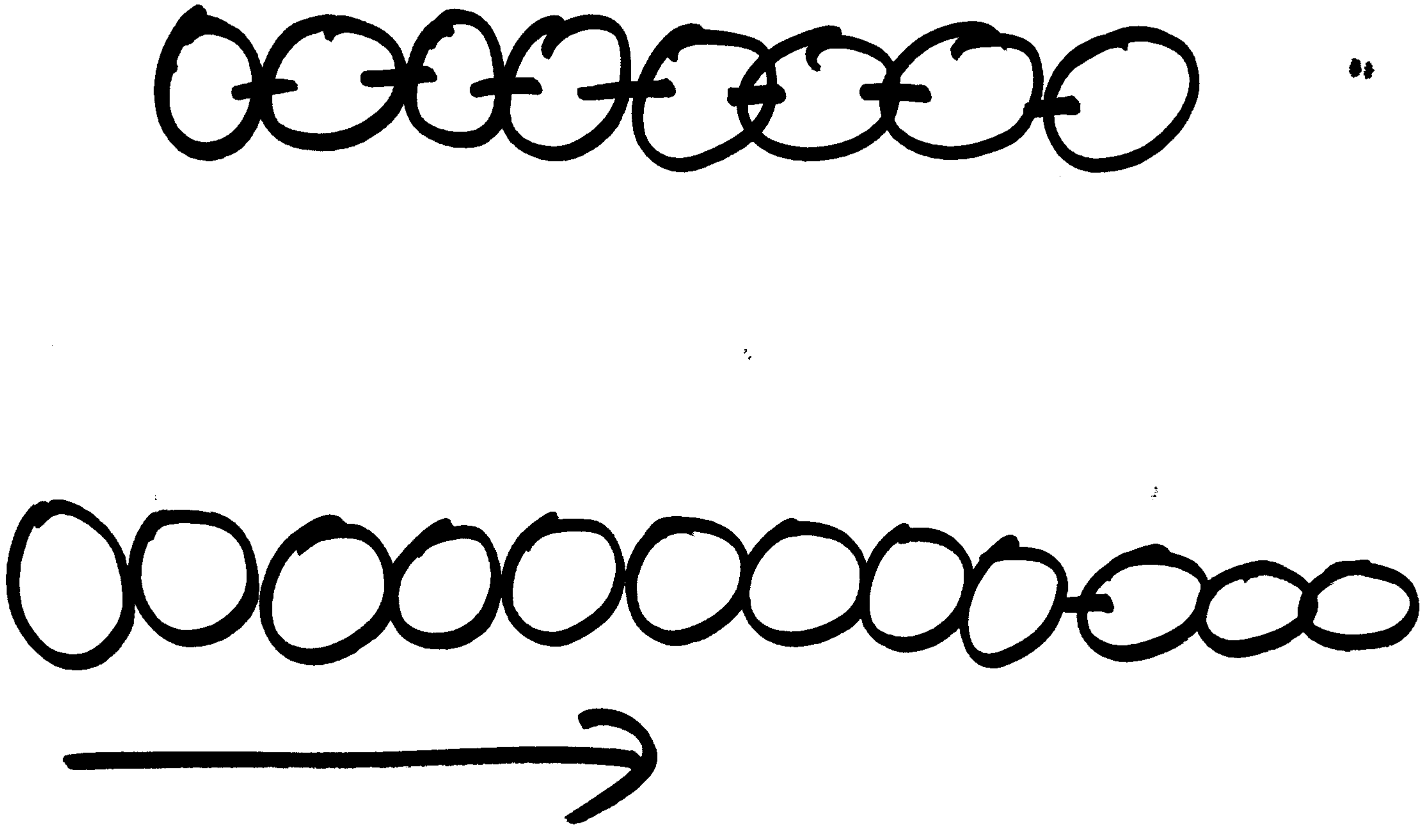
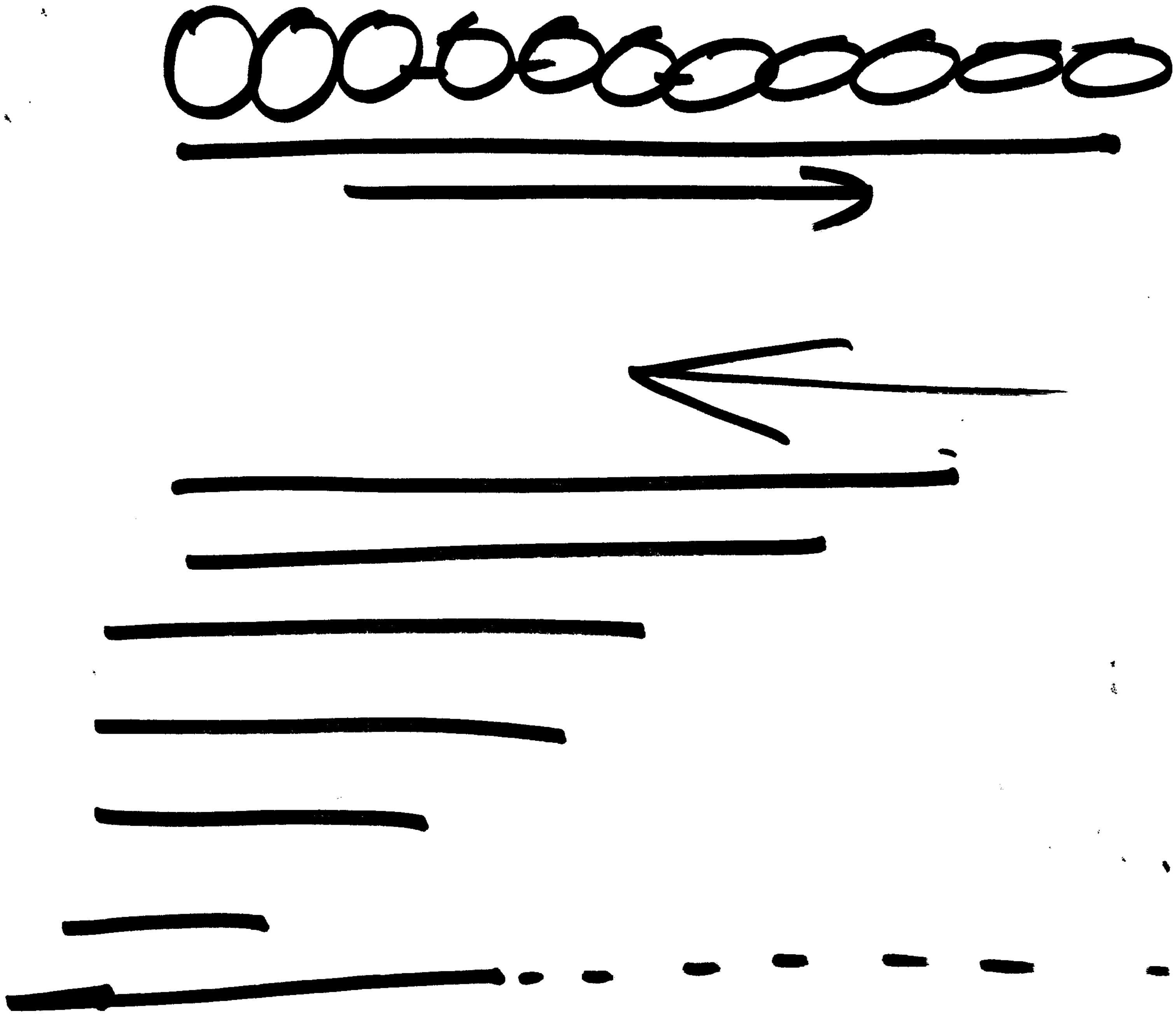
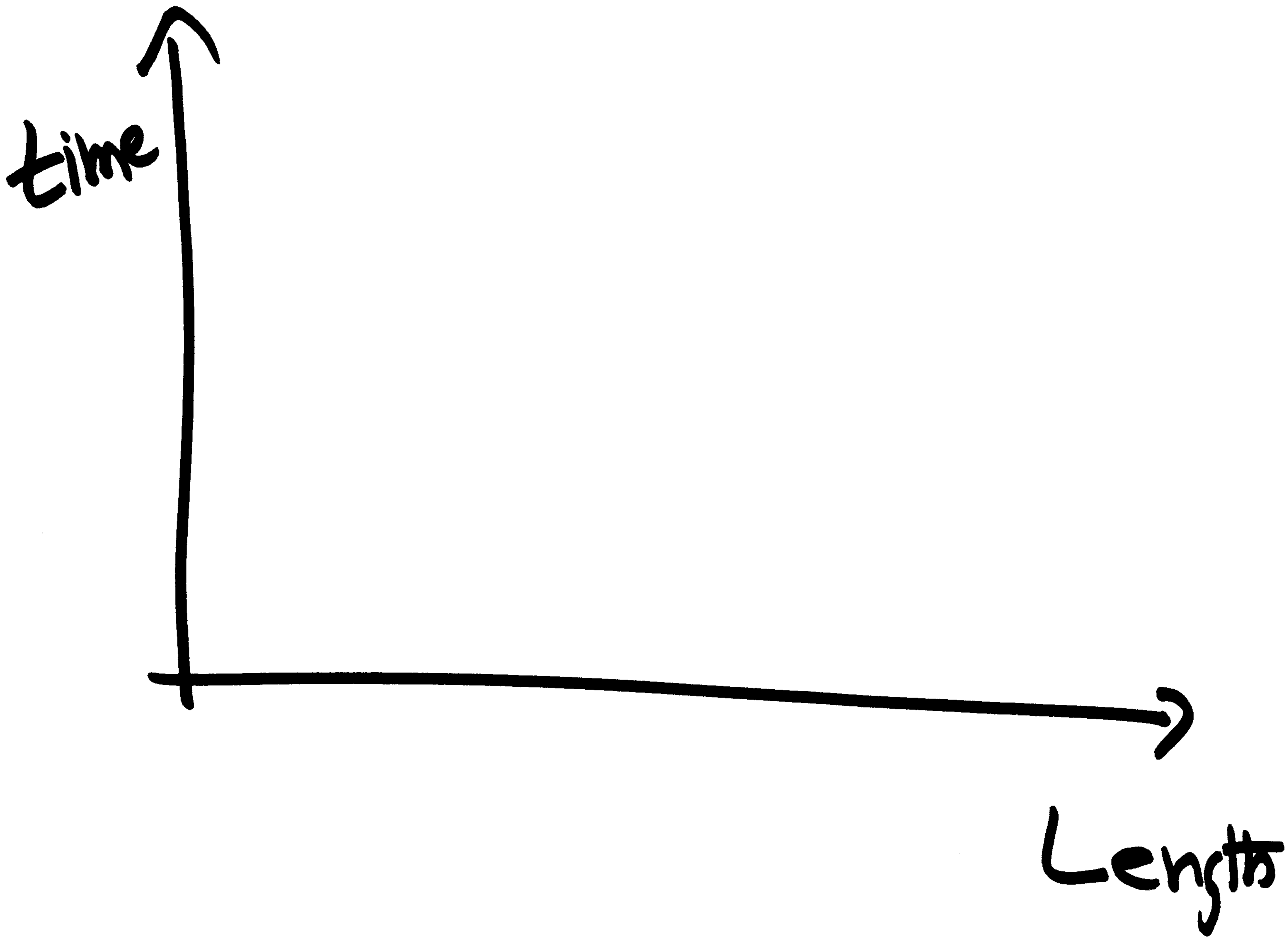
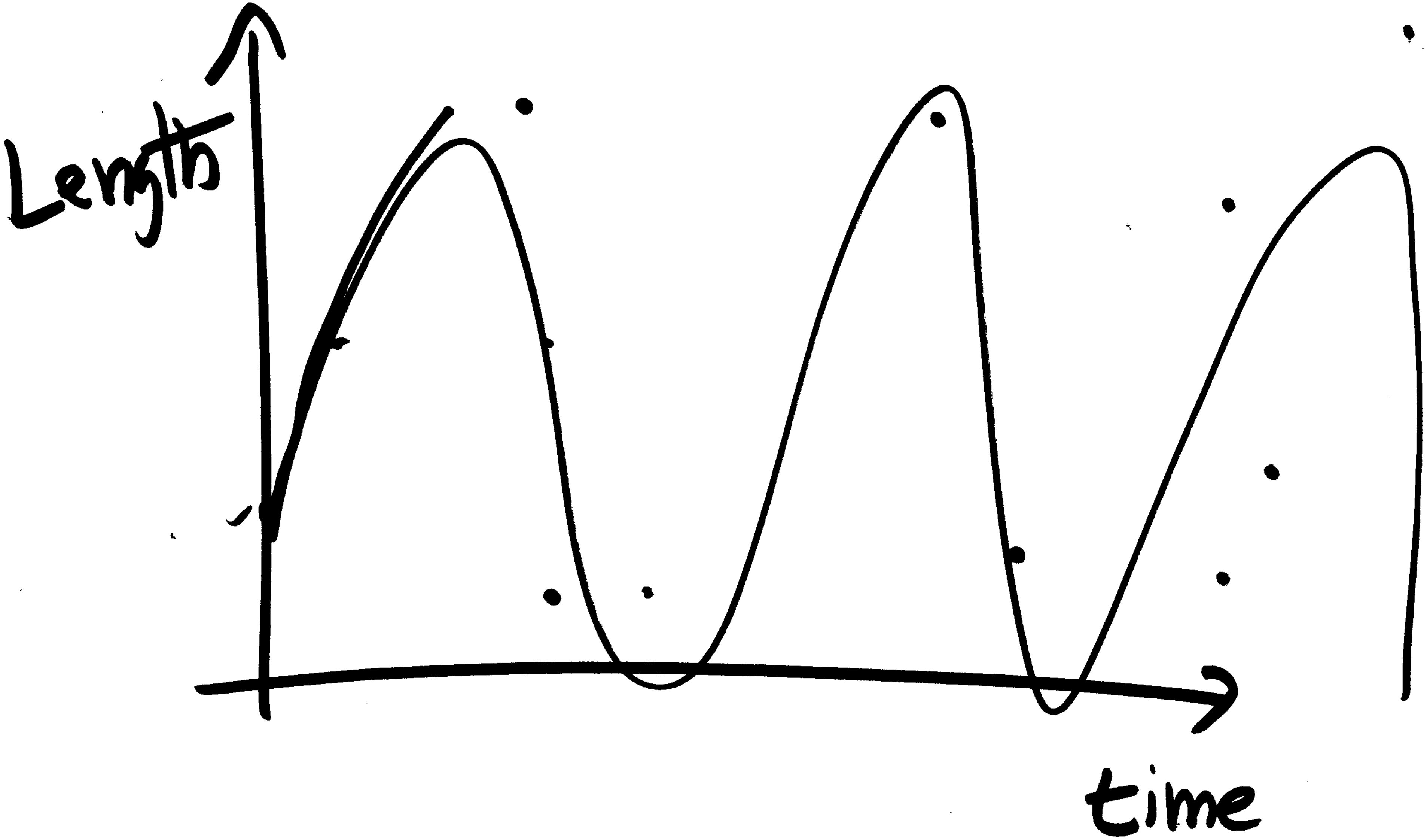
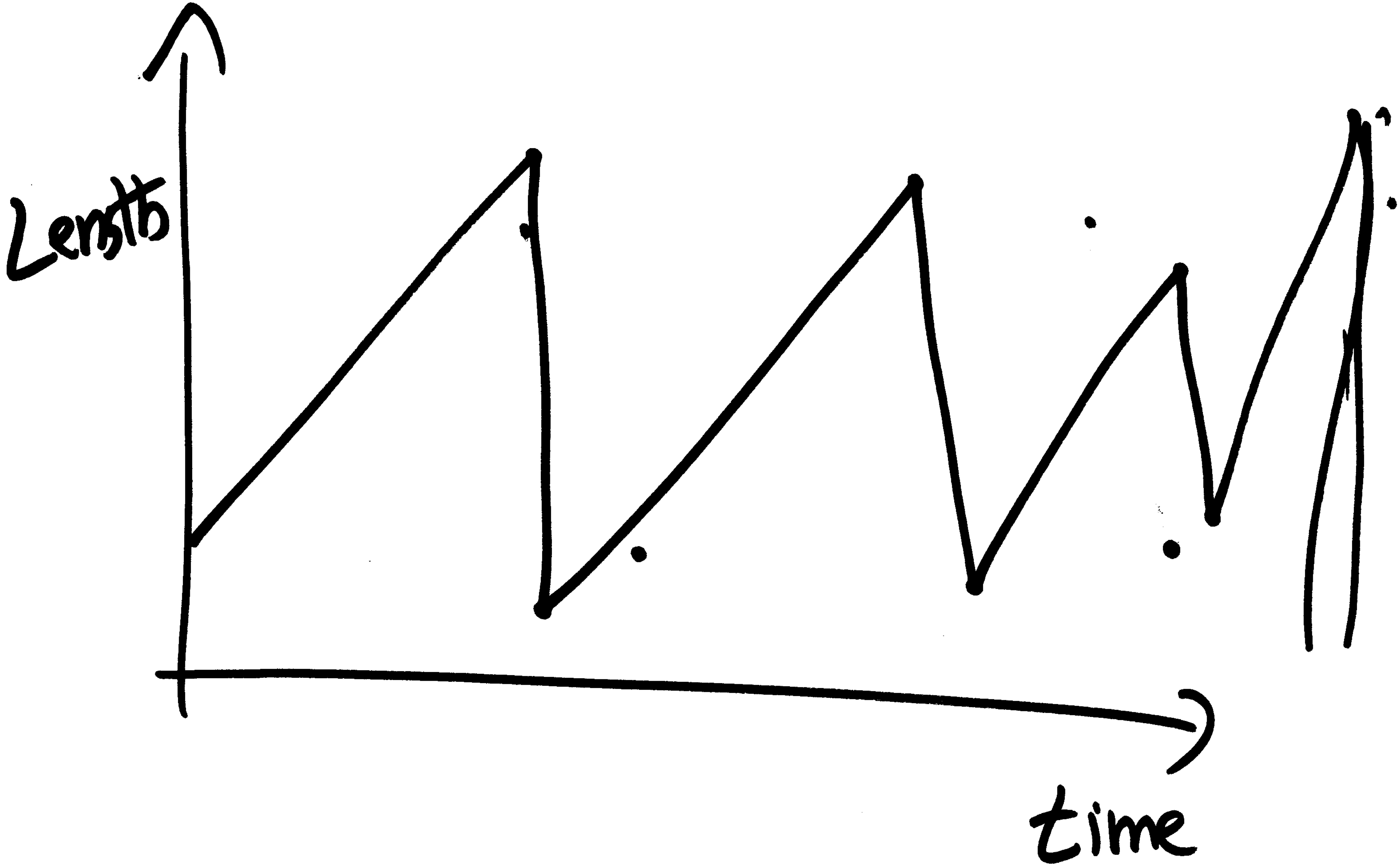





time
Length


Length
time

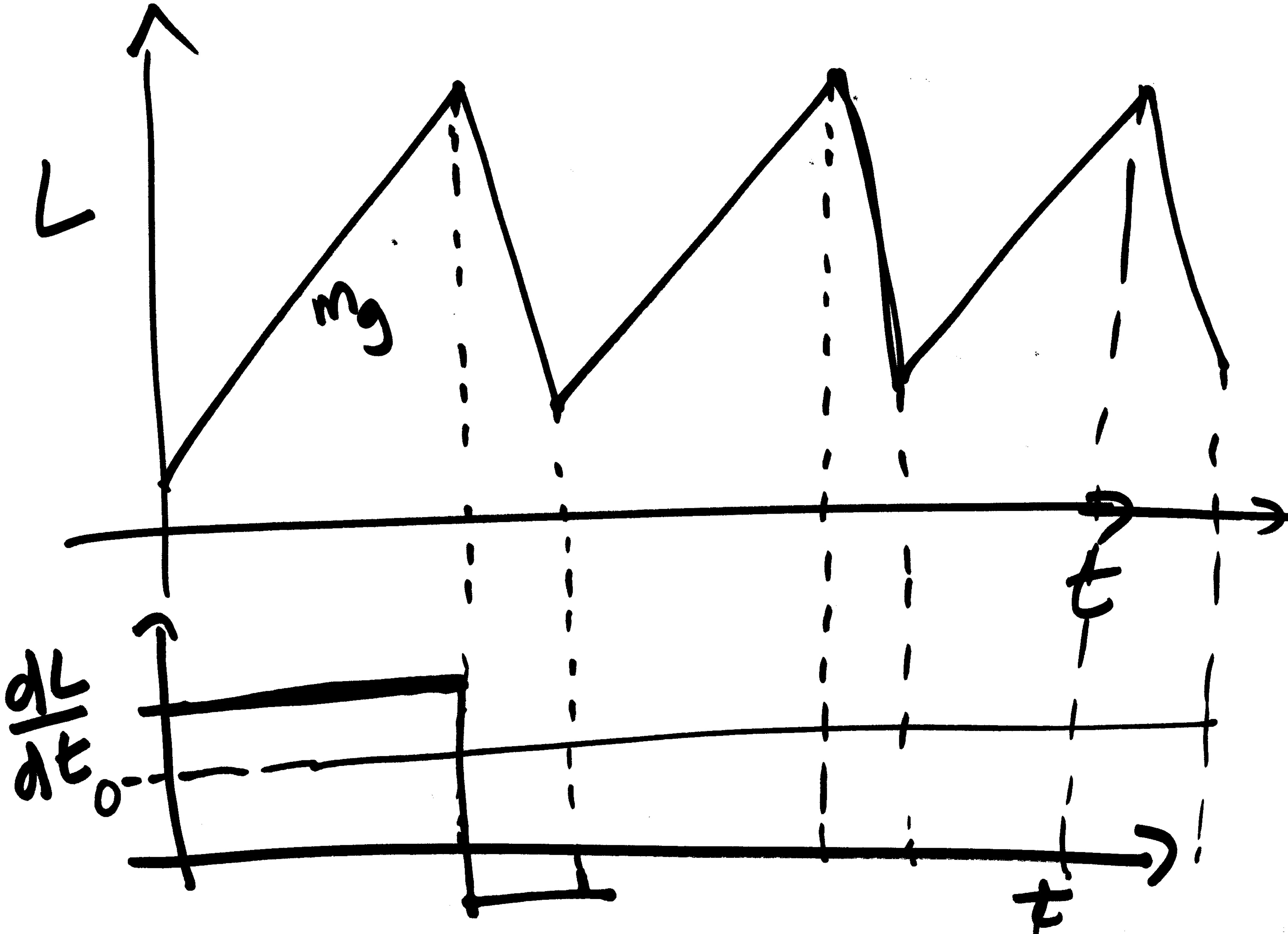

Length
time


L
t

① Book: by J. Howard.

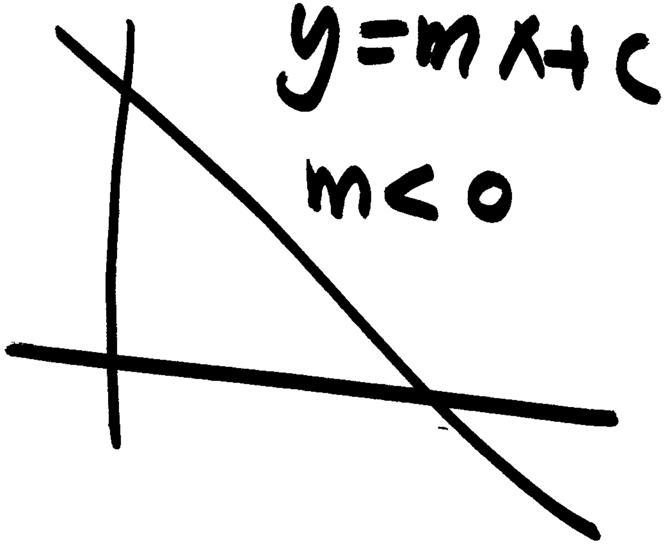
② Alberts et al ~~Mole~~

~~Molecular~~ Cell

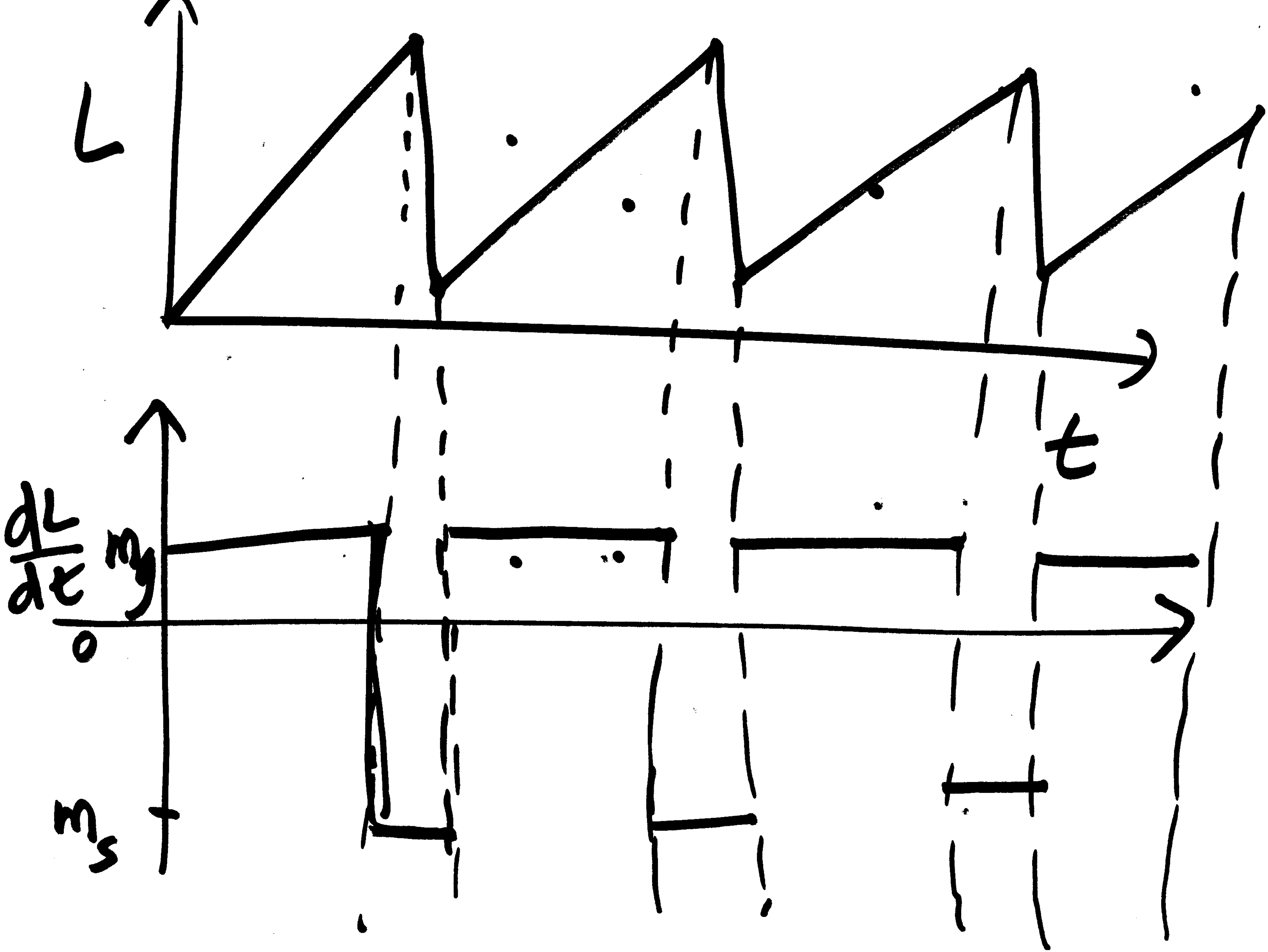

L
mg
t
dL
dt
0
t

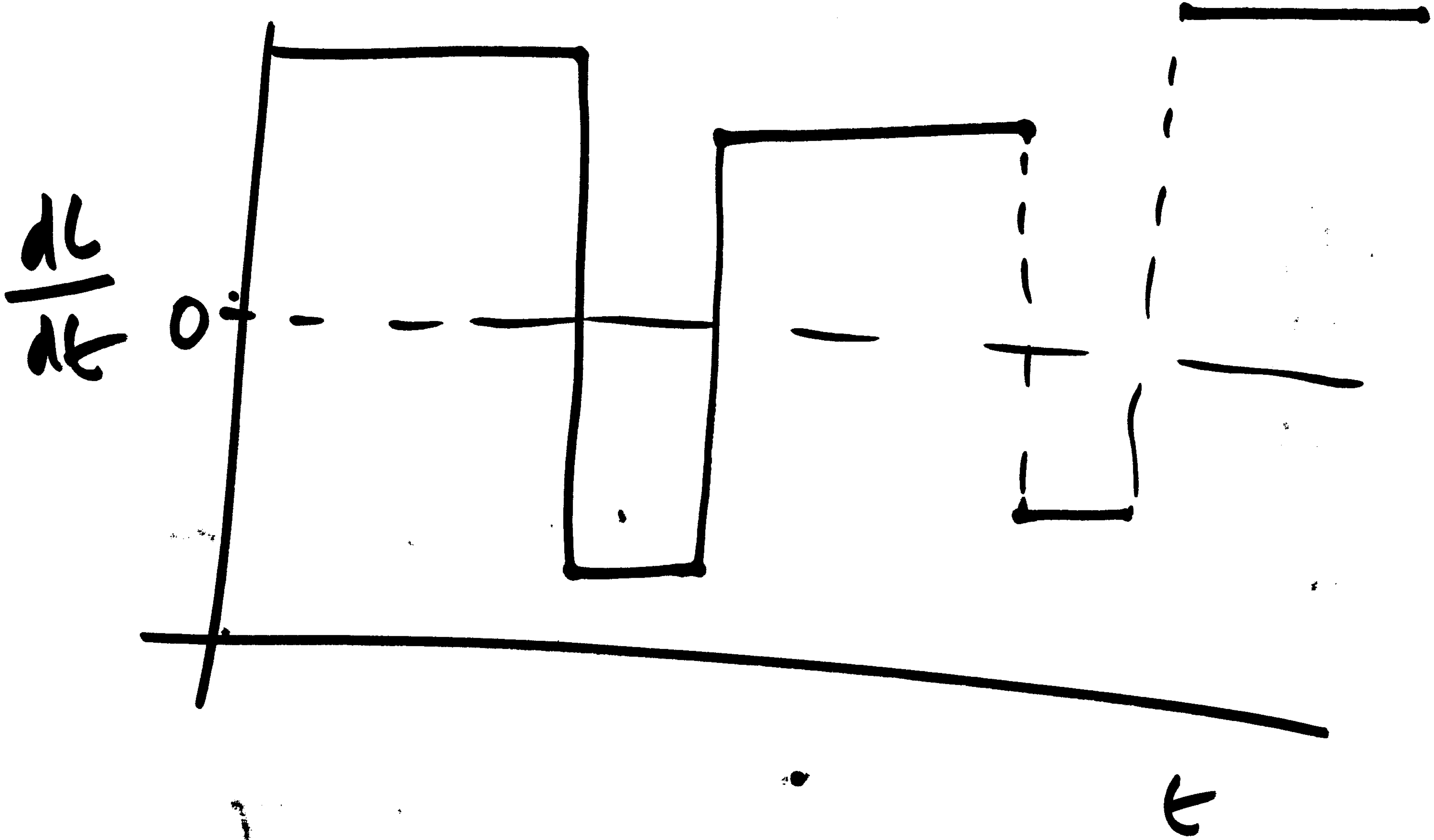
$$y = mx + c$$

$$\frac{dy}{dx} = m$$

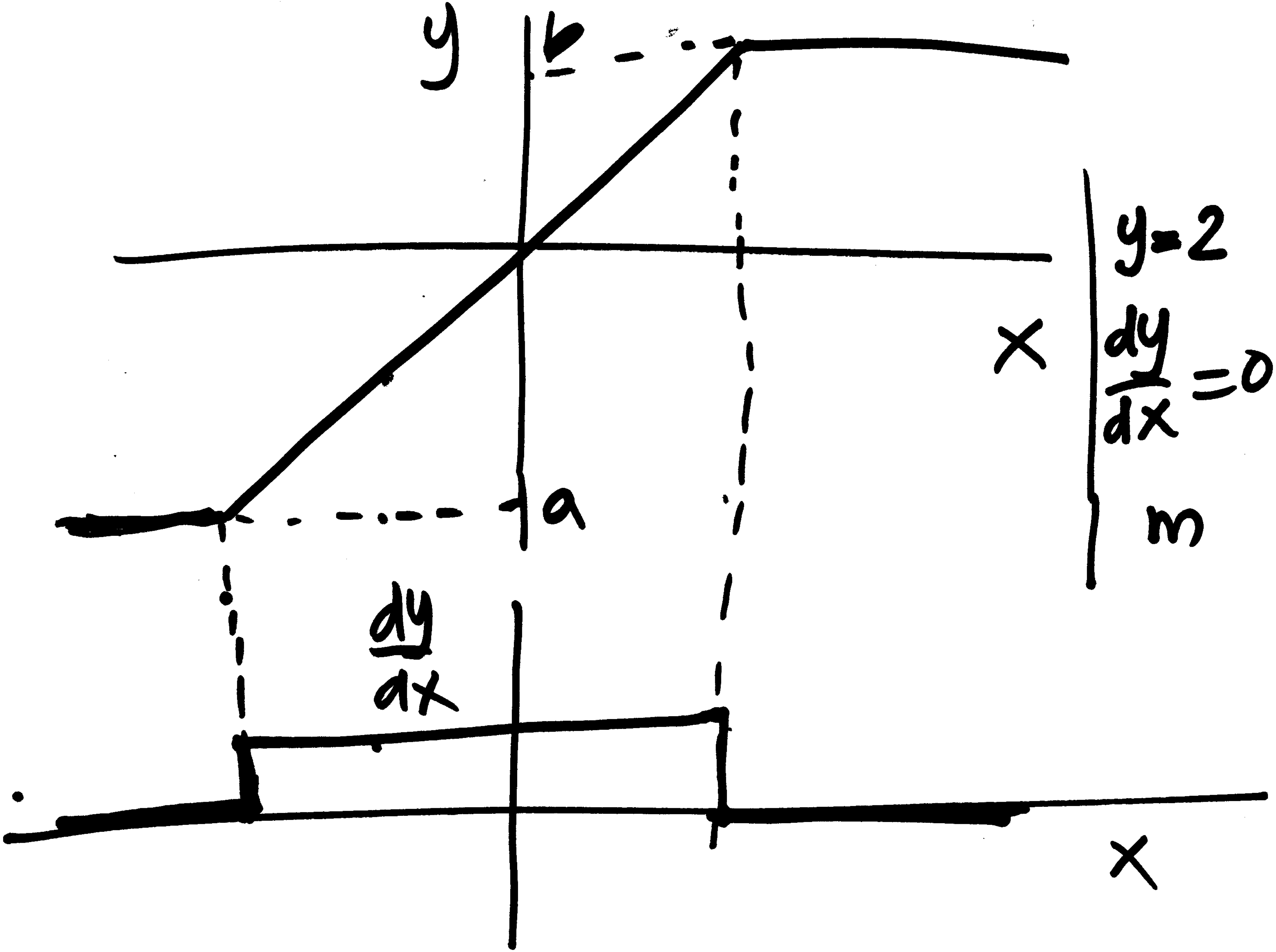


$$m < 0$$

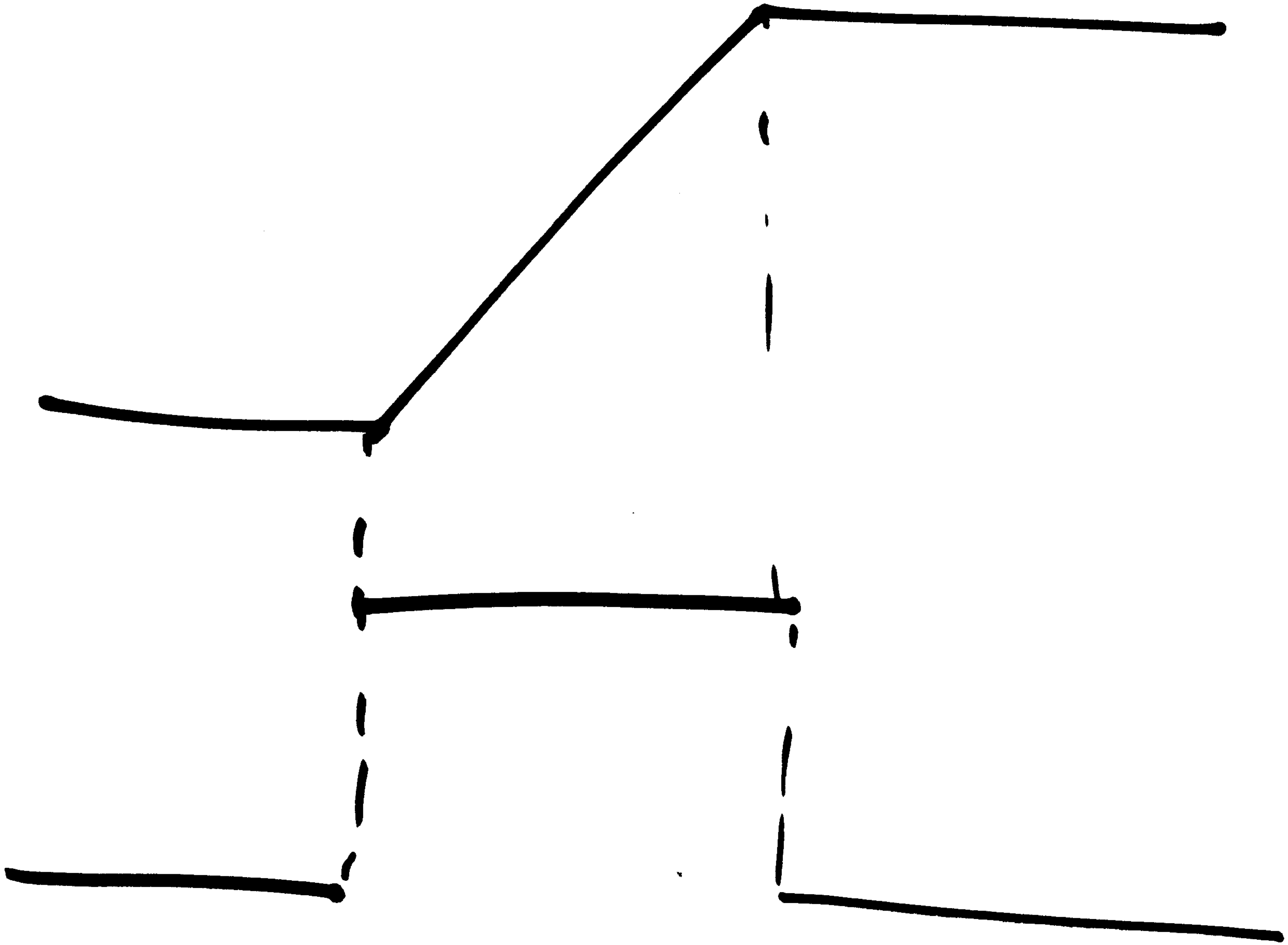

L
t
dL/dt
m_g
0
m_s

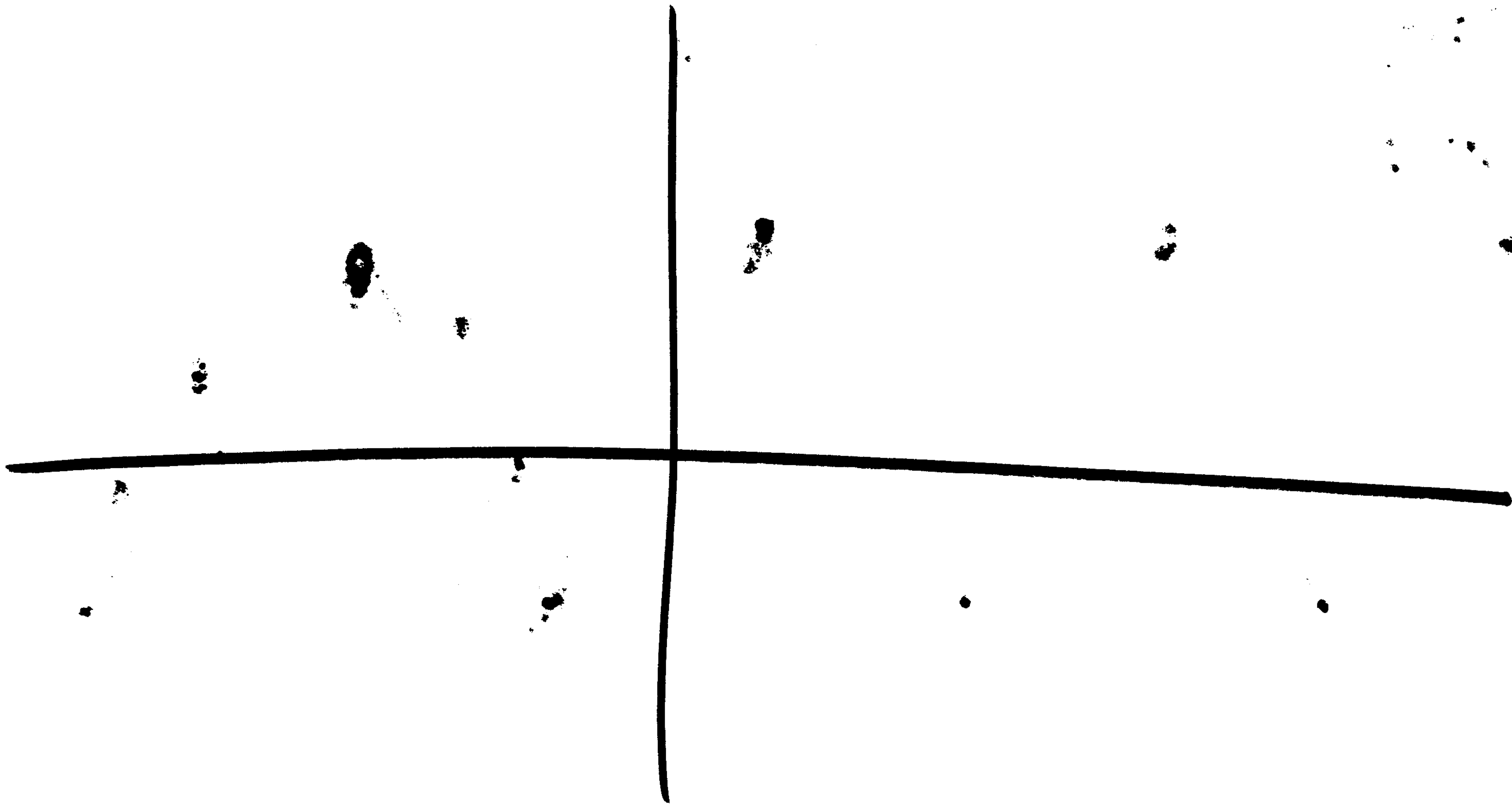


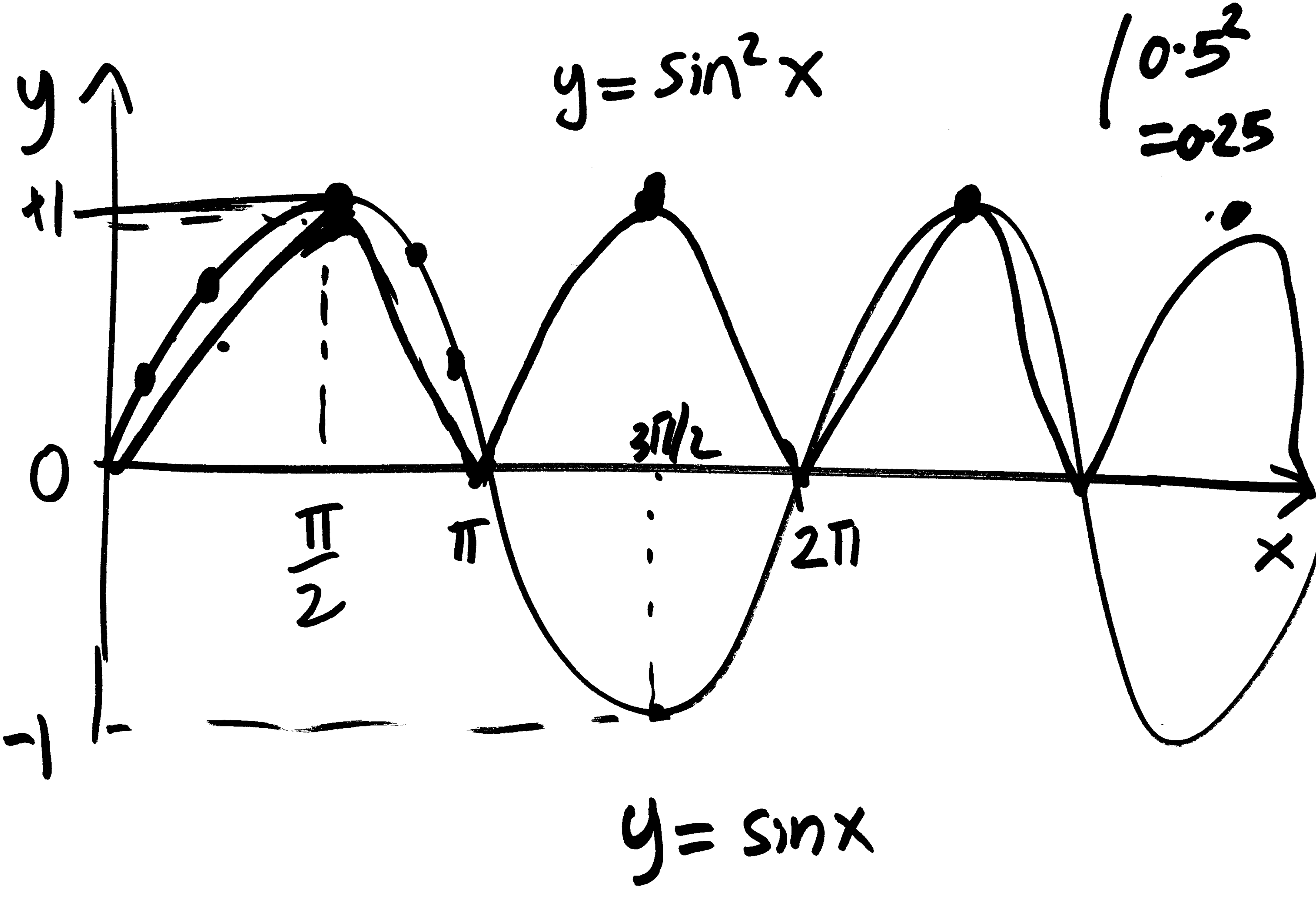
dL/dt
0
t



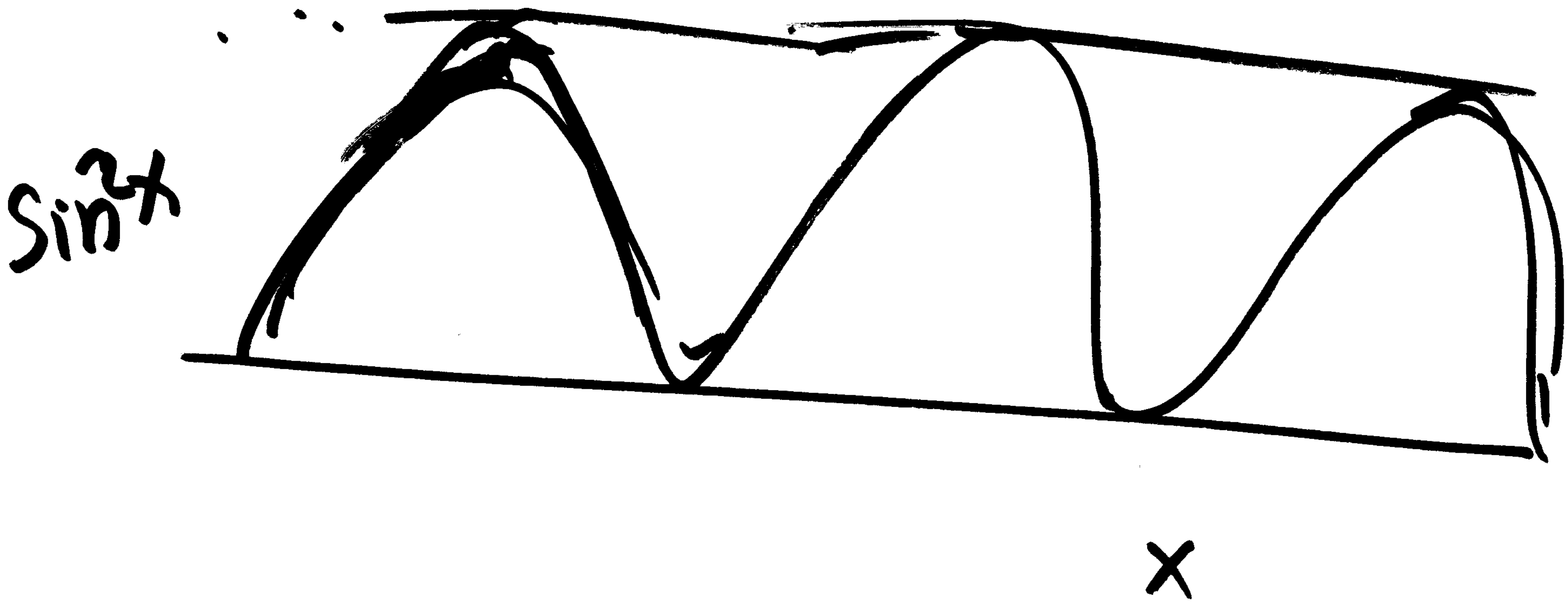
y
b
a
x
y=2
dy/dx =0
m
dy/dx
x







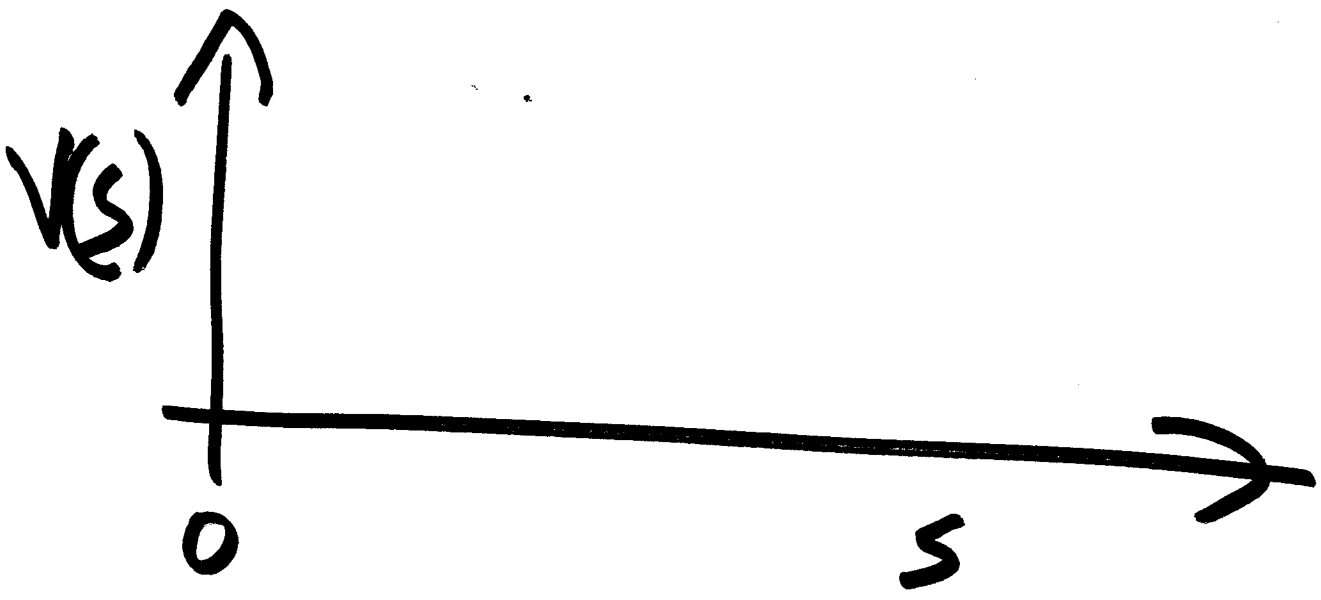
y
+1
0
-1
π/2
π
3π/2
2π
x
y = sin²x
0·5²
=0·25
y = sinx



sin²x
x

$$v(s) = \frac{v_m s}{k_m + s}$$

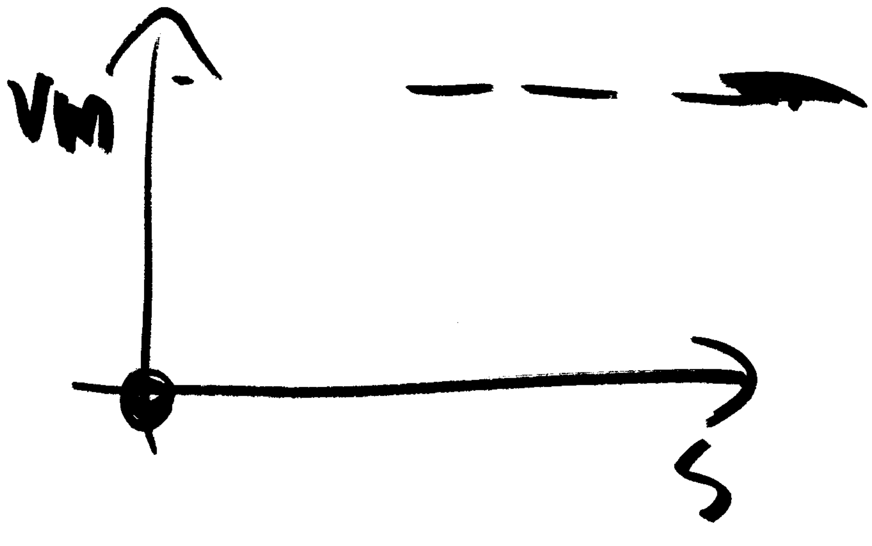
$s = 0$ to $s = \infty$



$$V(S) = \frac{V_m S}{K_m + S}$$

At $S = 0$

$$\frac{0}{K_m + 0} = 0$$



At $S = \infty$

$$v = \frac{V_m S}{K_m + S} = \frac{\infty}{\infty}$$

$V_m > 0$, $K_m > 0$

L' Hospital rule

$$\frac{d}{ds}(V_m s) = V_m = \frac{V_m}{1}$$

$$\frac{d}{ds}(K_m + s) = 1$$

$s \to \infty \quad v \to V_m$

$$v(s) = \frac{V_m s}{K_m + s}$$

$$\frac{dv}{ds} = \left[\frac{d}{ds}(V_m s)\right]\left(\frac{1}{K_m + s}\right) \; \text{~~+ (Vm s) d~~}$$

$$+ \; \text{~~1/(Km+s)~~} \; (V_m s)\frac{d}{ds}\left(\frac{1}{K_m + s}\right)$$

$$v(s) = \frac{\sout{Km\,S}}{} \quad \frac{V_m S}{K_m + S}$$

$$\frac{dv}{ds} = \frac{d}{ds}\left[(V_m S)(K_m + S)^{-1}\right]$$

$$= \left(\frac{d}{ds} V_m S\right)(K_m + S)^{-1} + (V_m S)\frac{d}{ds}(K_m + S)^{-1}$$

$$= \frac{V_m}{K_m + S} - (V_m S)\frac{1}{(K_m + S)^2} = 0$$

$$1 = \frac{S}{K_m + S}$$

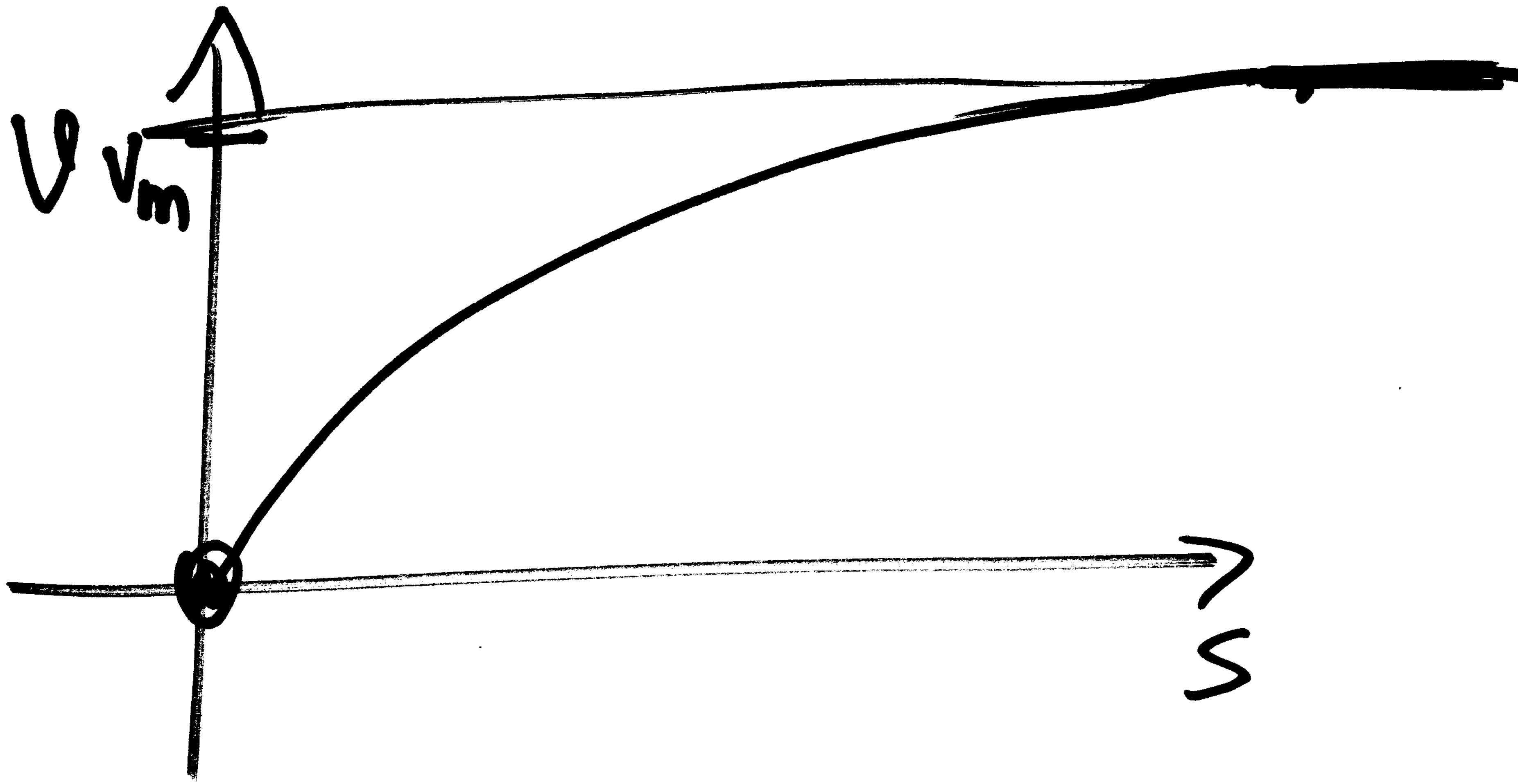
$$\frac{\cancel{V_m}}{\underline{\cancel{K_m + S}}} = \frac{\cancel{V_m}\, S}{(K_m + S)^{\cancel{2}}}$$

↑

$Km+5 = 5$

if $Km > 0$

$\Rightarrow$ No minimum or maximum


v
v_m
s