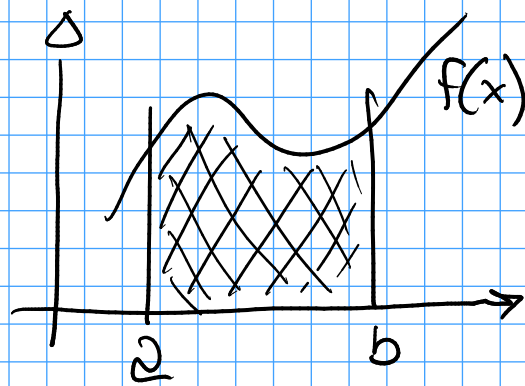
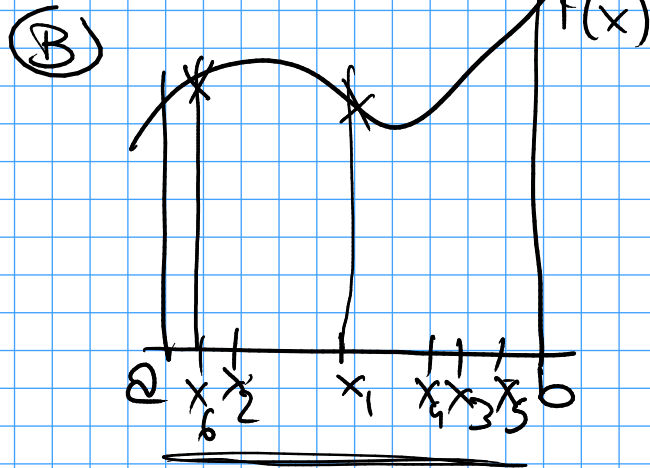
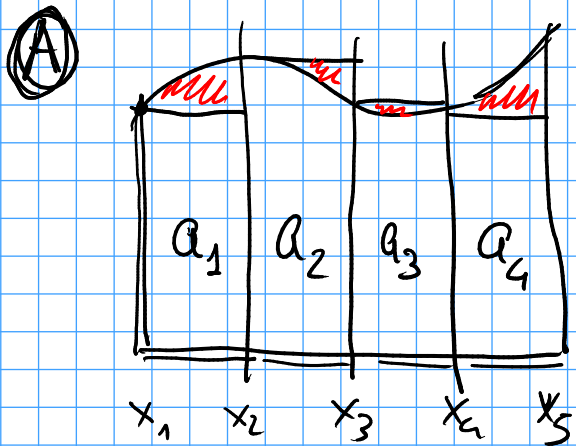


Monte Carlo



$$\int_a^b f(x) dx = \lim_{n \rightarrow \infty} \frac{1}{n} \sum_{i=1}^n f(x_i)$$



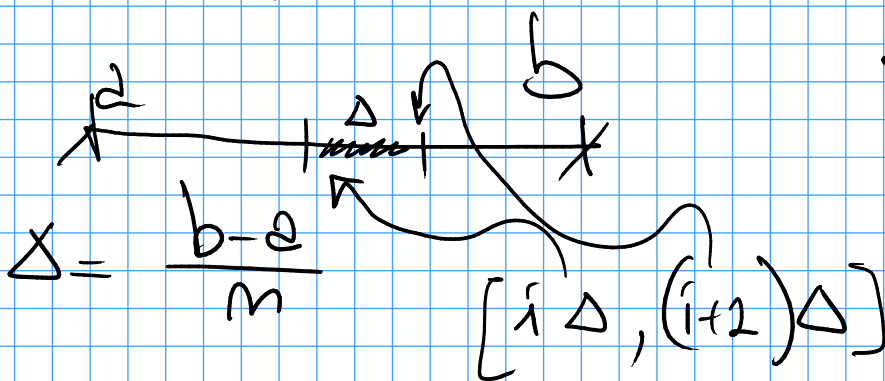
map (area del rettangolo) (intervalli)

reduce (+)

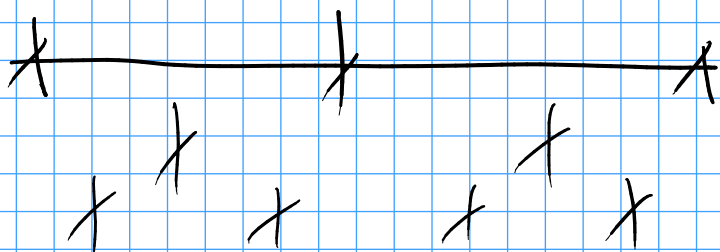
map f $\{x_i\}$

reduce (+)

scalar ($1/n$)



$$x_{i+1} = (a x_i + c) \text{ mod } m$$



Fase 1 (serie)

genero n numeri pseudo casuali

Fase 2 map (f)

Fase 3 reduce (+)

Fase 4 (serie) $1/n$

f $(1-f)$ $sp(n) = 1/f$

Soluzioni NATIF (N è valida del punto di vista matematico)

1 generatore $\rightarrow x_1 x_2 \dots x_k$ (serie)
 $\underbrace{\hspace{10em}}$
 semi $\times k$ generatori

$x_1 \rightarrow \text{seed}(x_1) \quad \text{rnd}() \quad \text{-----}$

$x_2 \rightarrow \text{seed}(x_2) \quad \text{rnd}() \quad \text{-----}$

$x_3 \rightarrow \text{seed}(x_3) \quad \text{rnd}() \quad \text{-----}$

\vdots

$$x_{i+1} = (ax_i + c) \bmod m$$

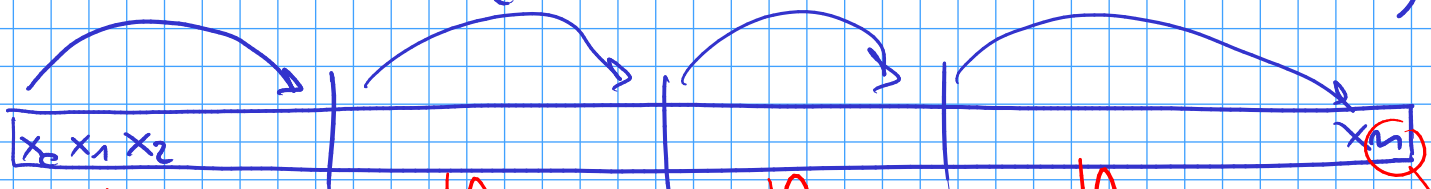
$$x_0 \quad (ax_0 + c) \bmod m \quad (a(ax_0 + c) \bmod m + c) \bmod m$$

$x_1 \qquad \qquad \qquad x_2$

$$x_{i+k} = (A x_i + C) \bmod m$$

$$A = a^k \bmod m$$

$$C = c(a^{k-1} + a^{k-2} + a^{k-3} + \dots + a^1 + a^0)$$



$\downarrow h_1$

$\downarrow h_2$

$\downarrow h_3$

$\downarrow h_4$

$\rightarrow x_i \quad f(x_i)$
 $f(x_i) + \text{sum}_1$

sum_2

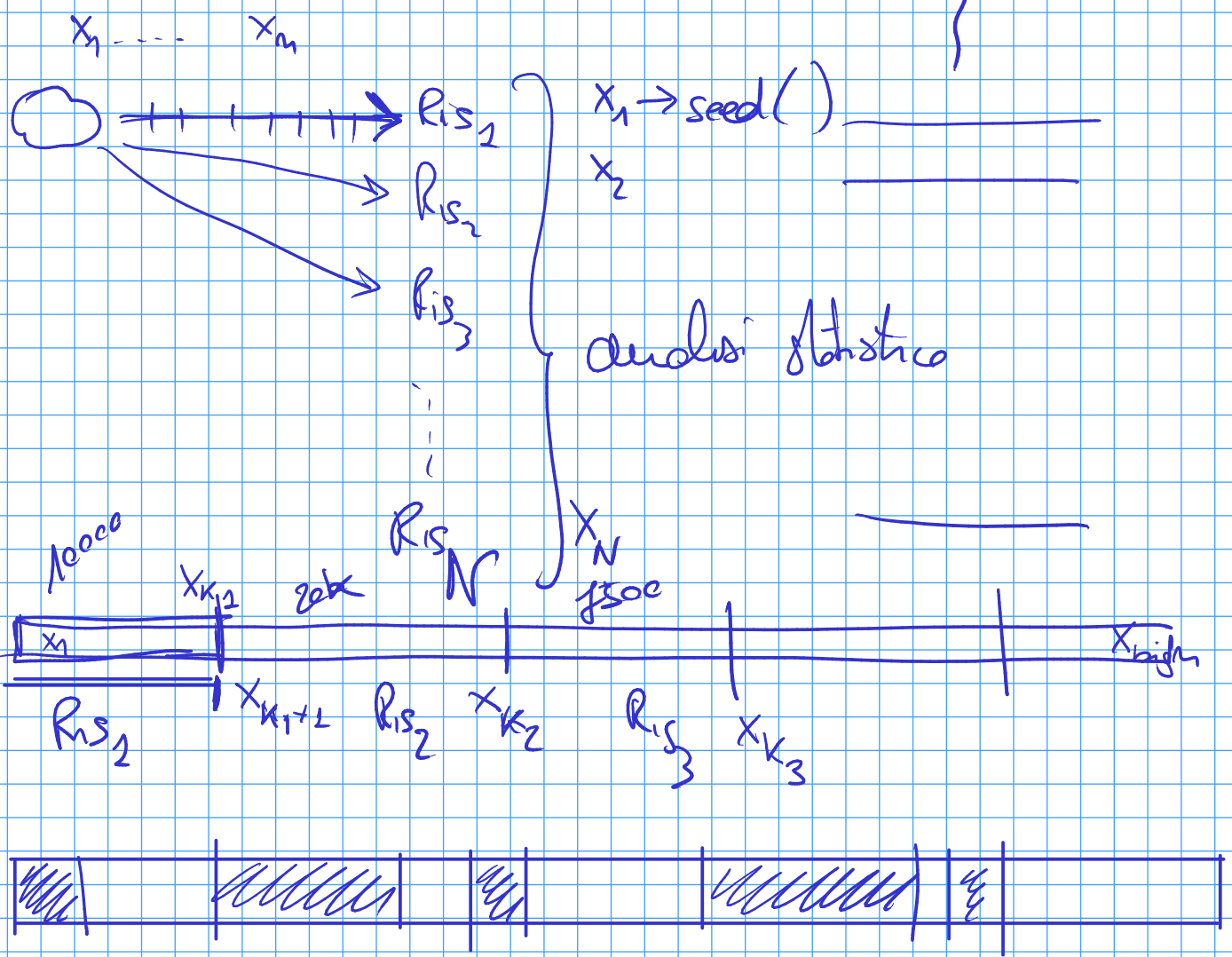
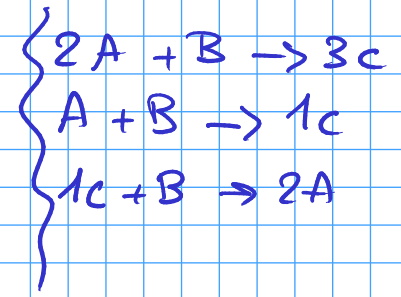
sum_3

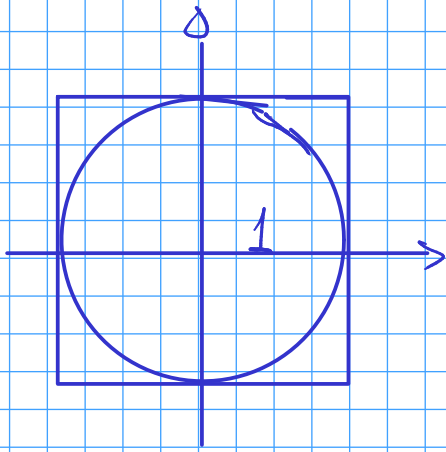
sum_4

$$(\sum \text{sum}_i) / m$$

Gillespie

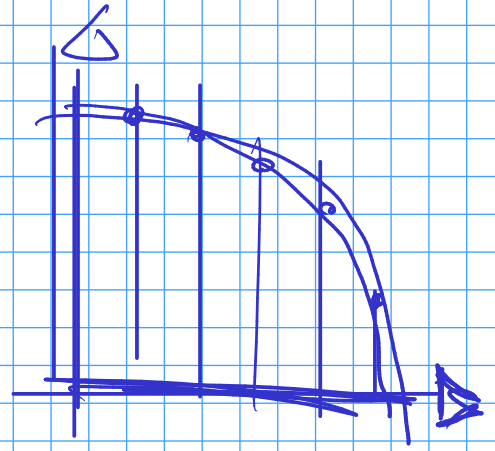
A B C
 μ_a μ_b μ_c





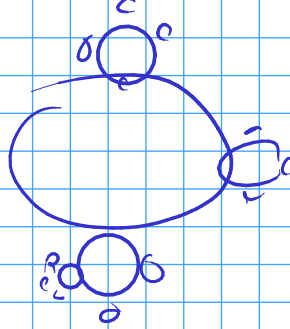
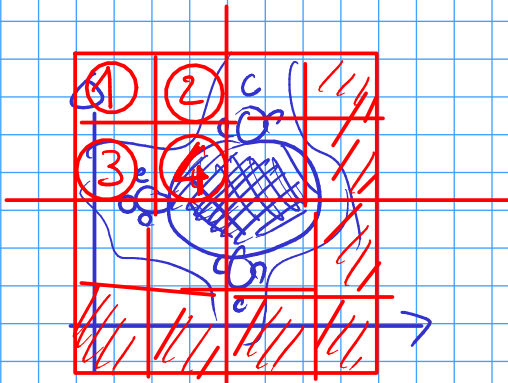
$$A_c = \hat{u}$$

$$A_q = 4$$

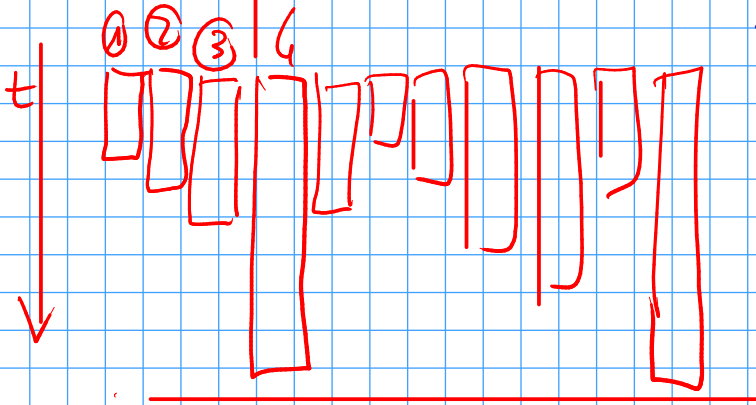
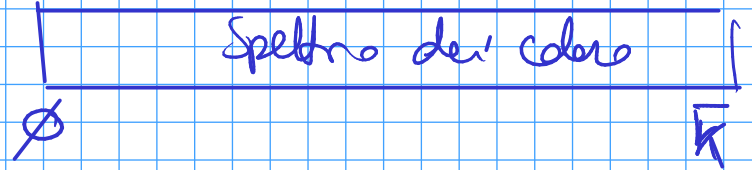


$$\hat{u}/4$$

MANDEL BROT

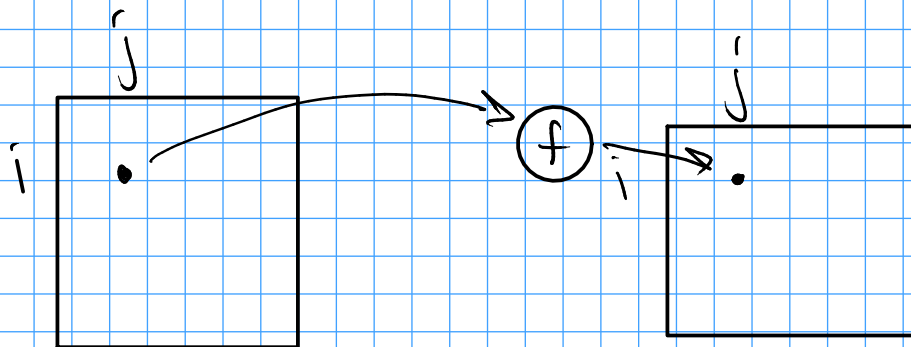
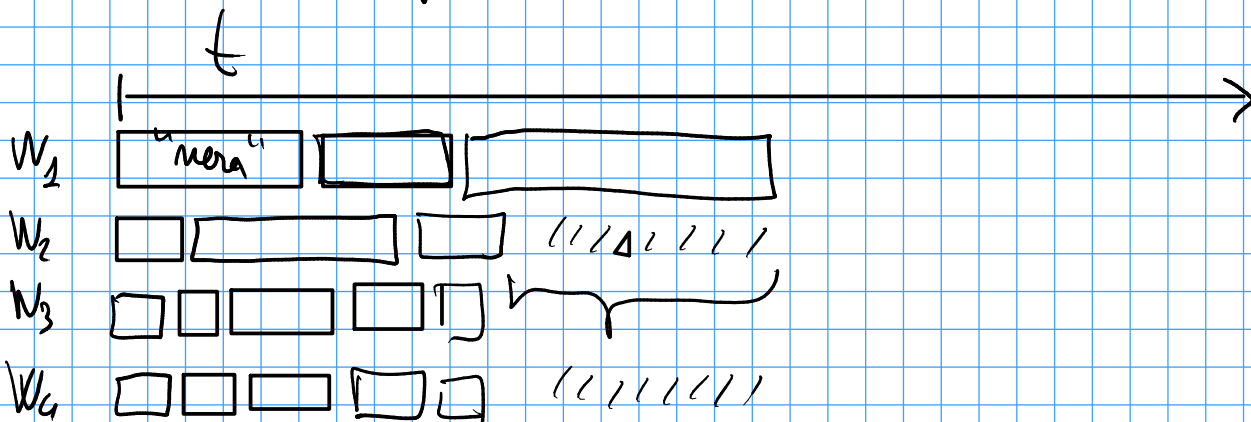
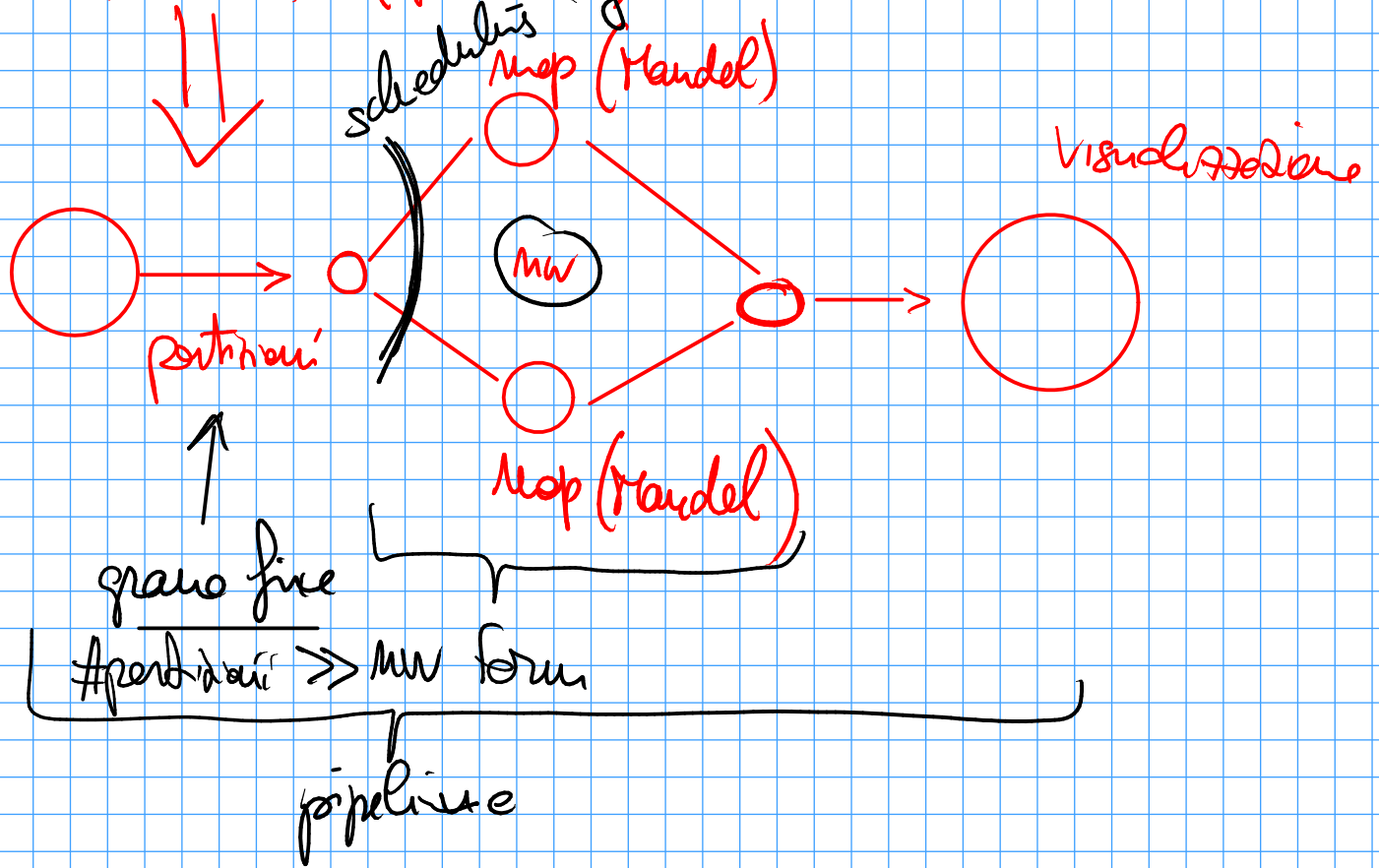


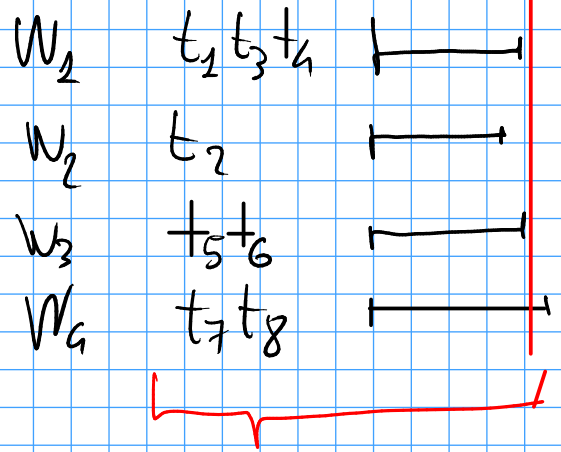
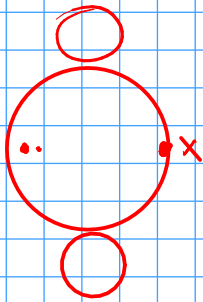
$$z_{k+1} = z_k^2 + c$$



```
for(i=0; i<K; i++) {  
    z_{k+1} = ...  
    if (z_{k+1} > threshold) {  
        break; // il colore  
               // e' i  
    }  
    // il colore e' nero
```

map (Mandel) (partition) "funks" ← auto scheduling

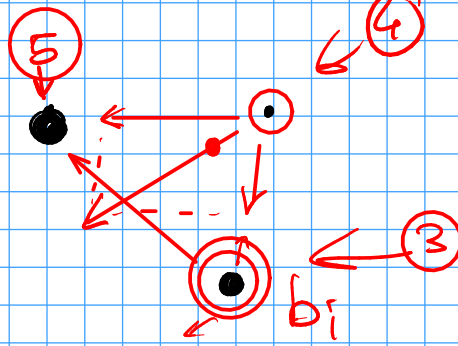




N-body

$$F = ma$$

$$\frac{dv}{dt}$$



map (tutti i corpi)
corpi i-esimo

map (tutti gli altri corpi)

Σ forze che mi influenzano

Δ moltiplicando

map (tutti i corpi) calcolando Δx
 Δy
 Δz

Corpo i	x	y	z	m_i
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Bornes Hat

