

1d)

$$h \approx \frac{\text{domain size}}{\# \text{particles per dim}} = \frac{1}{32} \approx 0.03$$

$$\varepsilon \ll h$$

very fast diffusion / interaction with neighbors

$$\varepsilon \approx h$$

decent diffusion

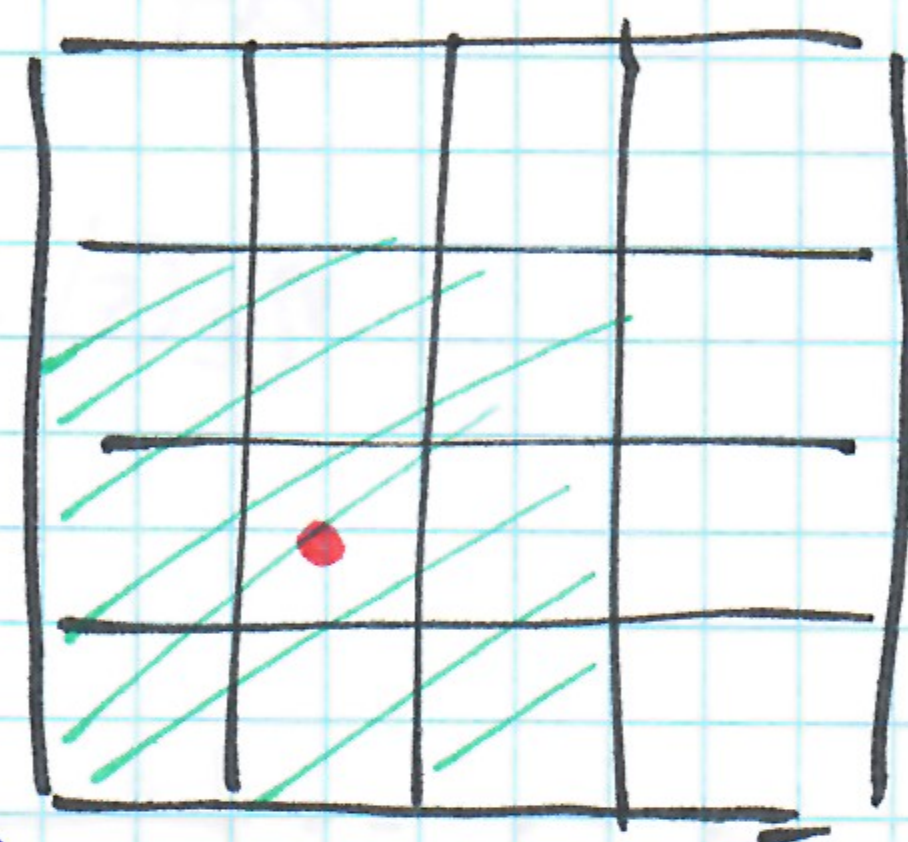
$$\varepsilon \gg h$$

very slow diffusion / interaction with neighbors

2)

a) ²¹ matrix of cells

- loop over cells and introduce particles in each cell (on grid)



⇔ introduce particles and subsequently, based on (x_i, y_i) store index of particles belonging to specific cell (variable size)

- b) • loop over cells and consider interaction with particles in neighboring cells

neighbor (cell)

$$\text{idx} = [(i-1+N) \% N, i, (i+1) \% N]$$

$$\text{idy} = [(j-1+N) \% N, j, (j+1) \% N]$$

for symmetric boundary,

$$(0,2) \rightarrow \text{idx} = [(-1+4) \% 4 = 3, 0, (0+1) \% 4 = 1]$$

$$\text{idy} = [(2+4) \% 4 = 2, 2, (2+1) \% 4 = 3]$$

$$(0,0) \dots (3,0)$$

$$(0,2)$$

$$(0,3) \dots (3,3)$$

d)