Counting FLOPs (floating-point operations)

- Floating-point numbers, "floats" : (inexact) machine rep. of $\mathbb{R}$
- Floating-point operations : $(+, -, \times, \div)$ with floats
- Much slower than integer operations (consists of several integer operations)
- A way of estimating efficiency of algorithm : count FLOPs
- Note : FLOPs vs FLOPS (floating-point op. per second)
  ↳ measure of computer performance

- Ex 1)

$$y = ab + c$$

1 multi.
1 add.

2 FLOPs

- Ex 2)

for $i = 1, \dots, n$ (n repetitions)

$y_i = a y_{i-1} + i$ (2 FLOPs)

$\Rightarrow$ 2n FLOPs

- Ex 3)

for $i = 1, \dots, n$ (n rep.)

$y_i = \frac{a}{b} y_{i-1} + i$ (3 FLOPs)

$\Rightarrow$ 3n FLOPs Silly!

Better :

$c = \frac{a}{b}$ (1 FLOP)

for $i = 1, \dots, n$ (n rep.)

$y_i = c\, y_{i-1} + i$ (2 FLOPs) $\Rightarrow$ 2n+1 FLOPs

$\approx$ 2n FLOPs Faster!